TECHNICAL MANUAL

AVIATION-CREW SYSTEMS

OXYGEN EQUIPMENT

(CONCENTRATORS)

N68936-04-D-0008

This manual update includes Basic, dated 1 April 2001, thru Change 5, dated 1 August 2004.

This manual supersedes the following NAVAIR manuals, 13-20FP-1, 13-20FP-2, 13-20FP-5 and 13-20FP-6.

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LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

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Major changes resulting from this change are as follows:

1. Incorporation of Aircraft Accident Report Inspection information.
2. Miscellaneous changes.
3. Addition of Chapter 9 (O_2N_2 Concentrator, Type GGU-xx/A, P/N 3261129-0101 and 3261129-0102).

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CHAPTER 1

INTRODUCTION

1-1. GENERAL.

WARNING

Unauthorized modifications to and deviations from prescribed life support and survival equipment by individual aircrewmembers could create unknown safety hazards. The OPNAVINST 3710.7 Series specifies minimum requirements for such equipment and is supplemented by the individual model NATOPS.

1-2. The OPNAVINST 4790.2 Series identifies NAVAIRSYSCOM as the only authority for modification to life support equipment and survival equipment, which is usually accomplished by the Fleet Support Team (FST) (formerly Cognizant Field Activity (CFA)) via Aircrew System Changes or a change to the equipment procurement package. This manual also permits operating activity with approval of the controlling custodian, to conditionally modify ONE unit of equipment in service to correct or overcome unsatisfactory conditions in that equipment item. Any other type of deviation, peculiar configuration, or modification to life support and survival equipment is not allowed, and Aircrew Survival Equipmentmen have no authority or responsibility to perform them.

1-3. If an omission or conflict should occur between FST documents and NATOPS requirements, if there is a need for clarification of equipment configuration, or if equipment deficiencies are discovered, the applicable FST should be notified. The FST for most of the life support and survival equipment is the Naval Air Warfare Center Aircraft Division (NAWCAD) Code 4.6.3.2, NAS Patuxent River, MD, 20670-1906. For parachutes and related hardware, including torso harnesses, the FST is the Naval Air Warfare Center Weapons Division, Code 463000D, China Lake, CA, 93555.

1-4. Naval Air Warfare Center, Indianapolis, Indiana has cognizance over all survival radios and emergency beacons.

1-5. This Aviation Crew Systems manual is released under the authority of the Naval Air Systems Command in compliance with the request of the Chief of Naval Operations. The instructions continued herein are mandatory. This manual consists of separately bound volumes as listed below:

TITLE	PUBLICATION NUMBER
Inflatable Survival Equipment (Liferafts)	NAVAIR 13-1-6.1-1
Inflatable Survival Equipment (Life Preservers)	NAVAIR 13-1-6.1-2
Parachutes	NAVAIR 13-1-6.2
Seat Survival Kits (Oxygen Hoses and Non-SKU Seat Kits)	NAVAIR 13-1-6.3-1
Seat Survival Kits (SKU Series Seat Kits)	NAVAIR 13-1-6.3-2
Oxygen Equipment (Aircraft Equipment, Masks, and Other Systems)	NAVAIR 13-1-6.4-1
Oxygen Equipment (Regulators)	NAVAIR 13-1-6.4-2
Oxygen Equipment (Concentrators)	NAVAIR 13-1-6.4-3
Oxygen Equipment (Converters)	NAVAIR 13-1-6.4-4
Rescue and Survival Equipment	NAVAIR 13-1-6.5
Aircrew Personal Protective Equipment (Aircrew/Passenger Equipment)	NAVAIR 13-1-6.7-1
Aircrew Personal Protective Equipment (Clothing)	NAVAIR 13-1-6.7-2
Aircrew Personal Protective Equipment (Helmets and Masks)	NAVAIR 13-1-6.7-3
Aircrew Personal Protective Equipment (Protective Assembly, Aircrew Survival - Armor)	NAVAIR 13-1-6.7-4
Special Missions Aircrew Equipment	NAVAIR 13-1-6.10

1-6. The purpose of each volume is to provide technical information related to the configuration, application, function, operation, storage, and maintenance of a particular category of aircrew safety and survival equipment. The information contained in each volume is intended for Organizational, Intermediate, and Depot Levels of maintenance as established within the Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

1-7. DESCRIPTION OF NAVAIR 13-1-6.4-3.

1-8. CONTENTS. This volume contains information and instructions pertaining to the configuration, function, application, operation, storage, and maintenance of oxygen equipment.

1-9. CONFLICTS AND SUPERSEDURE. This volume shall take precedence over all other documents except for effective Aircrew System Bulletins and Changes and Interim Aircrew System Bulletins and Changes. These documents are effective until officially rescinded, canceled, or superseded.

1-10. The Modification Section of each chapter lists all effective changes which affect oxygen equipment and have been issued on or before the date of latest change or revision to this volume. When applicable, the subject matter of these documents has been incorporated within the text of the appropriate chapters of this volume.

1-11. Effective changes and bulletins which affect oxygen equipment and are issued between changes or revisions to this volume should be recorded in the modification section of the manual for the affected equipment by annotating the outer margin of the page with a vertical line and the number of the change or bulletin. A copy of the change or bulletin should be filed in a separate binder in the ALSS work center. When this volume is updated these documents will be listed in the modification sections of the applicable chapters and the text of the chapters will be updated as required.

1-12. UPDATING. This volume will be updated periodically by the issuance of a Revision which is a 100% replacement of pages. Between revisions, changes and rapid action changes will be released, which are partial replacement of pages. All added and changed pages shall be incorporated in the volume according to page number. Superseded and deleted pages shall be discarded in accordance with local security procedures for data containing distribution statements. A list of effective pages is provided with each change. A summary of the major changed areas for a particular change is located directly beneath the list of effective pages.

1-13. COMMENTS AND RECOMMENDATIONS. Comments and recommendations shall be submitted in accordance with OPNAVINST 4790.2 Series.

1-14. ENGINEERING DRAWINGS. Government engineering drawings are available to the fleet by submitting a letter of request to Commanding Officer, Naval Air Technical Data and Engineering Service Command, Naval Air Station North Island, P.O. Box 357031, Building 90 Distribution, San Diego, CA 92135-7031. Each request should include the equipment nomenclature, part number, and CAGE code. The Drawings will be provided in the form of aperture cards (Automatic Data Processing Punch Cards). Technical data may also be obtained online at the NATEC website located at http://www.natec.navy.mil. Authorized users must first establish an account prior to obtaining data. Access/account information can be obtained at the NATEC website.

1-15. TECHNICAL DIRECTIVES AND FORMS. NATEC is the central management activity for aeronautical technical publications, engineering drawings and associated technical services. Upon release, NATEC will forward to all designated activities, copies of Technical Directives and Forms. Additional copies are available utilizing the procedures shown in paragraph 1-14 as well as from the PMA-202 website at https://pma202.navair.navy.mil.

1-16. SUPPLEMENTARY PUBLICATIONS.

1-17. In addition to Aircrew Systems Bulletins and Changes and Interim Aircrew Systems Bulletins and Changes still in effect, the following publications supplement this volume.

1. Naval Aviation Maintenance Program, OPNAVINST 4790.2 Series.

2. NAVAIR 00-35QH-2, Allowance List, Aviation Life Support System and Airborne Operation Equipment for Aircraft Squadrons Navy and Marine Corps.

3. Naval Logistical Library (NAVSUP 600), which lists directives and manuals available from the supply system.

4. The applicable Aircraft Maintenance Instruction Manuals, Planned Maintenance System Publications, NATOPS Flight Manuals, and Pilot's Handbooks.

5. OPNAVINST 4410.2A.

6. OPNAVINST 3710.7 Series provides general instructions on required minimums for aircrew personal protective equipment.

7. NAVFAC/DM-24. Naval Facilities Engineering Command design manual.

8. P2300. List of Repairable Assemblies and Applicability of Navy Aviation Materials.

9. P2310. List of Supporting Repair Parts of Navy Aviation Materials.

10. NAVSUPINST 4423.29 Series. Naval Material Command (NMC) Uniform Source, Maintenance and Recoverability (SM&R) Codes.

11. NAVAIR 13-1-6-8 Aviation Crew Systems Work Unit Code Manual.

12. NAVAIR 01-1A-509 Cleaning and Corrosion Control Organizational and Intermediate Maintenance.

13. NAVAIR 06-30-501 Technical Manual of Oxygen/Nitrogen Cryogenic Systems.

14. NAVSUPINST 4440.128 Compressed Gases and Gas Cylinders, Storage, Handling and Testing.

15. Ground Support Equipment. All Ground Support Equipment comments and recommendations shall be directed to the cognizant activities, Naval Air Engineering Center, Ground Support Equipment Dept., Lakehurst, NJ 08733.

16. NAVSUP P-719 is a Guide for the Assignment and Use of Source, Maintenance and Recoverability (SM&R) Codes.

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CHAPTER 2

MAINTENANCE CONCEPTS, SCHEDULING, AND DOCUMENTATION

Section 2-1. Maintenance Concepts

2-1. GENERAL.

2-2. NAVAL AVIATION MAINTENANCE PROGRAM. All maintenance and inspection actions upon Aviation Life Support Systems (ALSS) equipment shall be made as part of the Naval Aviation Maintenance Program in accordance with OPNAVINST 4790.2 Series.

2-3. LEVELS OF MAINTENANCE. Maintenance of ALSS equipment shall be performed at the established level of maintenance in accordance with OPNAVINST 4790.2 Series.

2-4. QUALIFIED PERSONNEL. Refer to OPNAVINST 4790.2 Series for qualifications of personnel authorized to perform maintenance actions on ALSS equipment.

Section 2-2. Maintenance Scheduling

2-5. GENERAL.

2-6. INSPECTION CYCLES. Scheduled maintenance requirements for aircraft and man-mounted equipment are published in the applicable aircraft maintenance requirement cards and this manual.

NOTE

To meet unusual situations and facilitate workload scheduling, refer to OPNAVINST 4790.2 Series for authorized deviations to scheduled phase inspection intervals.

Section 2-2A. Accident Evaluation

2-6A. AIRCRAFT ACCIDENT REPORT INSPECTION.

2-6B. Any Aviation Life Support System Equipment along with related subassemblies or equipment which have been recovered following use in an emergency ditching/bailout or ejection (refer to NAVAIR 13-1-6.2 for personnel and drogue parachutes) will be returned to the nearest Naval Supply Activity for shipment via traceable means to: Code 4.6.3.3, Naval Air Warfare Center Aircraft Division, Bldg 2187, 48110 Shaw Rd., Unit 5, Patuxent River, MD 20670-1906.

NOTE

Under no circumstances will any piece of Aviation Life Support System equipment which has been subjected to ditching/bailout or ejection be returned to service.

2-6C. Stencil outside of container in 1-in. letters as follows: THIS EQUIPMENT HAS BEEN USED IN AN EMERGENCY. These items of equipment are required for evaluation and determination of design deficiency and to establish requirements for product improvement.

Section 2-3. Maintenance Documents

2-7. GENERAL.

2-8. DOCUMENTING MAINTENANCE ACTIONS. Upon completion of any maintenance action (e.g., inspections, repairs, modifications), appropriate entries shall be made on applicable maintenance records, in accordance with OPNAVINST 4790.2 Series. The entries by the Aircrew Survival Equipmentperson shall provide a systematic record of equipment history and the documentation of all maintenance actions performed on the equipment.

2-9. MAINTENANCE DOCUMENTS. Refer to OPNAVINST 4790.2 Series for documents used to record history or to document maintenance actions or for additional information for completion of maintenance records. These records are designed to provide continuous configuration and inspection records throughout the service life of ALSS assemblies and their components.

Section 2-4. Illustrated Parts Breakdown Information

2-10. GENERAL.

2-11. This section explains the Illustrated Parts Breakdown (IPB) for ALSS equipment. The IPB can be found at the end of each chapter where applicable. The IPB should be used during maintenance when requisitioning and identifying parts.

2-12. SYMBOLS AND ABBREVIATIONS. Symbols and abbreviations used in the Illustrated Parts Breakdown are as follows:

Symbol	Definition
---*---	Closure (end) of attaching parts
#	Selected part, only one used
x	By (used in dimensions 12 in. x 6 in.)
&	And

Abbreviation	Definition
AR or A/R	As Required
CAGE	Commercial and Government Entity
COML	Commercially available
FIG, Fig	Figure
GAPL	Group Assembly Parts List
GFE	Government Furnished Equipment
IPB	Illustrated Parts Breakdown
L.H.	Left Hand
MAINT	Maintenance
NHA	Next Higher Assembly
No.	Number
RECOVER, RECY	Recoverability
REF	Reference
R.H.	Right Hand
SM&R	Source, Maintenance and Recoverability
Spec. Cont. Dwg. or SCD	Specification Control Drawing

2-13. GROUP ASSEMBLY PARTS LIST.

2-14. The Group Assembly Parts List (GAPL) contains illustrations and parts lists for each major assembly. These illustrations and accompanying lists show how the major assemblies are disassembled into subassemblies and detail parts. Each item illustrated is indexed for identification purposes. Each illustration is accompanied by a parts list providing a part number, description, and quantity for each item. The list is arranged in disassembly order. Through the use of a system of indentation, the relationship of the detail parts to the subassemblies and the relationship of the subassemblies to the main assembly, is shown.

2-15. FIGURE AND INDEX NUMBER COLUMN. The figure and index number of each item shown on the corresponding illustration appears in the Figure and Index Number Column, with the exception of assemblies and subassemblies which are not illustrated in assembled form. In these cases, the assemblies or subassemblies are listed but not indexed. The component parts thereof are both listed and indexed.

2-16. PART NUMBER COLUMN. This column contains the contractor's drawing number, government standard number, vendor drawing number or identifies the part as being commercial hardware (COML). Government standard parts are listed using the applicable MS, AN, AF, NAS, MIL, or JAN part number. Where the part number is controlled by a military specification, this specification number is listed in the Description Column.

2-17. DESCRIPTION COLUMN. This column lists the item name plus those modifiers necessary to identify the item. The description of a vendor-supplied item includes a five-digit number which identifies the manufacturer. This is the Commercial and Government Entity (CAGE) code. To correlate this CAGE code to the manufacturer's name, refer to the cataloging handbook H4/H8. CAGE codes may be omitted for prime manufacturer's parts and for government standard parts. When applicable, contractor's control drawing numbers and reference designations of electronic parts are also listed for general reference. When a separate exploded view is used to show the detail parts of an assembly or subassembly the Description Column contains an appropriate figure cross-reference in parenthesis following the description. This cross-reference appears both in the listing where the assembly is first described, and in the listing which the assembly is broken down. In the latter case, the abbreviation REF will appear in the Units Per Assembly column. Commercial hardware items (COML) are fully described so that they may be procured from normal commercial sources. Parts stocked in kits are identified with kit component code in this column, i.e., KD.

2-18. Indentation. The indentations headed "1" through "7" in the Description Column are provided to show the relationship of assemblies and their detail parts. The detail parts are indented one space to the right and listed below the assembly to which they belong. Determine the next higher assembly (NHA) of any detail part by locating, in the next space to the left (excluding attaching parts) the first item above the detailed part.

1 2 3 4 5 6 7

ARTICLE (or MAIN ASSEMBLY)
. Detailed parts for ARTICLE (or MAIN ASSEMBLY)
. ASSEMBLY
(ATTACHING PARTS)
. ATTACHING PARTS FOR ASSEMBLY
---*---
. . Detailed parts for ASSEMBLY
. . SUBASSEMBLY
(ATTACHING PARTS)
. . ATTACHING PARTS FOR SUBASSEMBLY
---*---
. . . Detailed parts for SUBASSEMBLY
. . . SUB-SUBASSEMBLY
(ATTACHING PARTS)
. . . ATTACHING PARTS FOR SUB-SUBASSEMBLY
---*---
. . . . Detailed parts for SUB-SUBASSEMBLY

2-19. Attaching Parts. Attaching parts are items used to attach parts or assemblies to each other and follow immediately after the part to be attached. The attaching parts have the same indentation as the part attached. The caption "(ATTACHING PARTS)" is placed on the line immediately above the listing of attaching parts. The separation symbol ---*--- appears on the line immediately under the last attaching part. Quantities of attaching parts are listed per unit. For example, if two fittings are required for each assembly and one bolt is required to attach each fitting, the correct listing would be:

. FITTING ASSEMBLY, Hinge 2
(ATTACHING PARTS)
. BOLT 1
---*---

2-20. UNITS PER ASSEMBLY COLUMN. This column shows the quantity of an item required in the next higher assembly. The abbreviation AR indicates when the quantity is "As Required".

2-21. USABLE ON CODE COLUMN. Usable on codes are used to indicate part usage where various models and serial numbers of the equipment or similar parts within the equipment use different parts. A code is assigned to each variation of the equipment and entered into the GAPL when a part is used only in a specified variation. Where no code is entered, the part is used on all units covered by the GAPL or when no variations from the original equipment exist.

2-22. NUMERICAL INDEX.

2-23. The numerical index which follows each GAPL contains all the part numbers listed in that GAPL, arranged in alphabetical-numerical sequence.

2-24. PART NUMBER COLUMN. This column contains the part numbers of the parts and assemblies. Part number arrangement starts at the extreme left-hand position and continues left to right, one position at a time, according to the following order or precedence:

Space	(blank column)
Diagonal	(Slant)
Point	(period)
Dash	(hyphen)
Letters	A through Z
Numerals	0 through 9

NOTE

Spaces, diagonals, points, and dashes do not appear in the extreme left-hand position of the part numbers. However, they may be used in the second and succeeding positions and take precedence over letters and numbers as indicated above.

2-25. FIGURE AND INDEX NUMBER COLUMN. In this column, the digits preceding the dash refer to the figure in which the parts are illustrated. The digits following the dash are the index numbers.

2-26. SOURCE, MAINTENANCE AND RECOVERABILITY (SM&R) CODE COLUMN. The five digit SM&R codes, assigned by Naval Air Systems Command Representatives are reflected in the SM&R code column. The code format is composed of three parts consisting of a two-position Source Code, a two-position Maintenance Code and a one-position Recoverability Code. See table 2-1 for basic information.

NOTE

For more complete information on Uniform SM&R Codes, refer to NAVSUPINST 4423.29, OPNAVINST 4410.2A, and NAVSUP P-719.

Table 2-1. Source, Maintenance, and Recoverability (SM&R) Code Definitions

SOURCE			MAINTENANCE			
1st POS	2nd POSITION		3rd POSITION		4th POSITION	
MEANS OF ACQUIRING SUPPORT			USE: LOWEST LEVEL AUTHORIZED TO REMOVE/ REPLACE THE ITEM.		REPAIR: LOWEST LEVEL WITH CAPABILITY AND RESOURCES TO PERFORM COMPLETE REPAIR ACTION.	
P	A	ITEM: STOCKED	O	ORG/UNIT	O	ORG/UNIT
	B	ITEM: STOCKED, INSURANCE				
	C	ITEM: STOCKED, DETERIORATIVE				
	D	ITEM: SUPPORT, INITIAL ISSUE OF OUTFITTING & STOCK ONLY FOR ADDITIONAL INITIAL ISSUE	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER	2 3 4 5 6	MINESWEEPER SUBMARINES AUX/AMPHIB DESTROYER, FFG CRUISER/CARRIER
	E	EQUIPMENT: SUPPORT, STOCKED FOR INITIAL ISSUE OR OUTFITTING OF SPECIFIED MAINTENANCE ACTIVITIES				
	F	EQUIPMENT: SUPPORT, NONSTOCKED, CENTRALLY PROCURED ON DEMAND	F	I/AFLOAT	F	I/AFLOAT
	G	ITEM: STOCKED FOR SUSTAINED SUPPORT. UNECONOMICAL TO PRODUCE AT A LATER TIME				
	H	ITEM: STOCKED, CONTAINS HAZMAT. HMIS/MSDS REPORTING REQUIRED	G	ASHORE AND AFLOAT	G	ASHORE AND AFLOAT
	R	TERMINAL OR OBSOLETE, REPLACED				
	Z	TERMINAL OR OBSOLETE, NOT REPLACED				
K	D	ITEM: DEPOT O/H & MAINTENANCE KITS	H	I/ASHORE	H	I/ASHORE
	F	ITEM: MAINTENANCE KIT, PLACE AT O, F, H, L				
	B	ITEM: IN BOTH DEPOT REPAIR AND MAINT. KITS				
M	O	MFR OR FAB AT UNIT LEVEL				
	F	MFR OR FAB AT INTERMEDIATE/DS LEVEL	K	CONTRACTOR FACILITY	K	CONTRACTOR FACILITY
	H	MFR OR FAB AT INTERMEDIATE/GS LEVEL				
	L	MFR OR FAB AT SPECIALIZED REPAIR ACTIVITY (SRA)				
	G	MFR OR FAB AT ASSEMBLED AFLOAT OR ASHORE				
	D	MFR OR FAB AT DEPOT MAINTENANCE LEVEL	L	INTERMEDIATE SRA	L	INTERMEDIATE SRA
A	O	ITEM: ASSEMBLED AT ORG/UNIT				
	F	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - AFLOAT				
	H	ITEM: ASSEMBLED AT INTERMEDIATE LEVEL - ASHORE	D	DEPOT	D	DEPOT
	L	ITEM: ASSEMBLED AT SRA				
	G	ITEM: ASSEMBLED AFLOAT OR ASHORE				
	D	ITEM: ASSEMBLED AT DEPOT MAINTENANCE LEVEL				
X	A	ITEM: REQUISITION NEXT HIGHER ASSEMBLY			Z	NON-REPAIRABLE
	B	ITEM: NOT PROCURED OR STOCKED, AVAILABLE THRU SALVAGE, REQ. BY CAGE/PART NUMBER	Z	REF ONLY		
	C	INSTALLATION DRAWING, DIAGRAM, INSTRUCTION SHEET, IDENTIFY BY CAGE/PART NUMBER			B	RECONDITION
	D	NON-STOCKED, OBTAIN VIA LOCAL PURCHASE				

RECOVERABILITY		SERVICE OPTION CODE	
5th POSITION		6th POSITION	
DISPOSITION: WHEN UNSERVICEABLE OR UNECONOMICALLY REPAIRABLE, CONDEMN OR DISPOSE.		ASSIGNED TO SUPPORT ITEMS TO CONVEY SPECIFIC INFORMATION TO THE SERVICE'S LOGISTICS COMMUNITY/OPERATING FORCES.	
O	ORG/UNIT	1	I-LEVEL 1ST DEGREE
F	I/AFLOAT	2	I-LEVEL 2ND DEGREE
G	ASHORE AND AFLOAT	3	I-LEVEL 3RD DEGREE
H	I/ASHORE	6	COMMERCIAL ITEM, ORGANICALLY MFR'D
K	DLR; CONTRACTOR FACILITY	8	NON-CONSUMABLE; 2ND DEGREE ENGINE I-LEVEL
		9	NON-CONSUMABLE; 3RD DEGREE ENGINE I-LEVEL
L	INTERMEDIATE SRA LEVEL	E	END TO END TEST
		J	INTER-SERVICE DLR REPAIRABLE BELOW D-LEVEL
D	DLR; CONDEMN OR DISPOSE AT DEPOT	P	PROGRESSIVE MAINTENANCE
Z	NON-REPAIRABLE	R	GOLD DISC REPAIR
A	NON-REPAIRABLE BUT REQUIRES SPECIAL HANDLING	T	TRAINING DEVICES

CHAPTER 3

OXYGEN EQUIPMENT – GENERAL INFORMATION, SAFETY, AND HANDLING

Section 3-1. Aircraft Oxygen Systems

3-1. GENERAL.

3-2. Aircraft Liquid Oxygen and Gaseous Oxygen Systems provide the aircrewmember with diluted or 100% oxygen for breathing. The Liquid Oxygen System provides facilities to store and convert liquid oxygen (LOX) to gaseous oxygen and to deliver the gaseous oxygen at a breathable temperature and pressure to the aircrewmember. The Gaseous Oxygen System provides facilities to store gaseous oxygen in cylinders at either high or low pressure and to deliver it to the aircrewmember at a reduced pressure for breathing. This chapter also contains safety precautions pertinent to handling and storage of liquid and gaseous oxygen equipment.

3-3. AIRCRAFT OXYGEN SYSTEMS.

3-4. Aircraft Oxygen Systems installed in naval aircraft fall into one of the following categories:

1. Gaseous Oxygen Systems
   a. Low Pressure (0-500 psig)
   b. High Pressure (0-1800 psig)
   c. Reduced High Pressure
2. Liquid Oxygen Systems

3-5. GASEOUS OXYGEN SYSTEMS. Gaseous Oxygen Systems are used primarily in multiplace aircraft where space and weight considerations are less important items. Basically, all Gaseous Oxygen Systems consist of the following:

1. A cylinder (or cylinders) for storing the oxygen supply.

2. Tubing to distribute the oxygen from the main supply to the user(s).

3. Various valves for directing the oxygen through the proper tubing.

4. A regulator (or regulators) to control the flow of oxygen to each user.

5. A gage (or gages) to indicate oxygen pressure.

6. A mask (or masks) to direct the flow of oxygen to each user.

NOTE

The aircraft Illustrated Parts Breakdown (IPB) shall be consulted for usable items and system makeup.

3-6. LIQUID OXYGEN SYSTEMS. Liquid Oxygen Systems are generally used in aircraft where space and weight and mission considerations are paramount. The typical system consists of the following components:

1. A converter (or converters) for storing the liquid oxygen supply.

2. A filler valve for servicing the system.

3. A heat exchanger for warming the oxygen to normal breathing temperatures.

4. A control valve for maintaining desired system operating pressure.

5. A relief valve to relieve excess pressure.

6. Tubing to distribute oxygen to the user(s).

7. Regulator(s), quantity indicator(s), shutoff valve(s) and other essential cockpit (or cabin) equipment.

NOTE

The aircraft Illustrated Parts Breakdown (IPB) shall be consulted for specific items used and make-up of the system for specific aircraft.

3-7. OXYGEN BREATHING REGULATORS.

3-8. DILUTER DEMAND TYPE REGULATORS. Diluter Demand Regulators are currently installed in some naval aircraft. They are used with Gaseous Oxygen Systems. The Diluter Demand Regulator provides the aircrewmember with an air-oxygen mixture, or 100% oxygen, depending on mode of operation selected. By placing the diluter lever (or knob) in the NORMAL position, an air-oxygen mixture is supplied upon demand up to approximately 28,000 to 32,000 feet. The ratio of oxygen-to-air is automatically adjusted to supply increasing oxygen as altitude increases. At approximately 32,000 feet, ambient air is shut off, and the user receives 100% oxygen. By selecting 100% OXYGEN, the regulator supplies 100% oxygen at all altitudes.

3-9. AUTOMATIC POSITIVE PRESSURE DILUTER DEMAND TYPE REGULATORS. Several types of Automatic Positive Pressure Diluter Demand Regulators are currently installed in naval aircraft. These regulators are used with either Gaseous or Liquid Oxygen Systems. Operation of the Automatic Positive Pressure Diluter Demand Regulator at altitudes up to 28,000 to 32,000 feet is basically the same as the Diluter Demand Regulator. Above approximately 30,000 feet, added oxygen at a positive pressure is supplied to the mask. This added pressure increases with altitude. Service ceiling of these regulators is 50,000 feet, but due to human limitations, Automatic Positive Pressure Diluter Demand Regulators shall not be used above 43,000 feet except for very short periods.

3-10. MINIATURE OXYGEN BREATHING REGULATORS. Miniature Oxygen Regulators reduce and regulate supply pressure, and deliver 100% oxygen to the user at a breathable pressure. A safety pressure feature automatically maintains a positive pressure of 0 to 2.5 in H_2O in the mask at all altitudes up to, and including, 34,000 feet. The pressure breathing feature maintains a positive pressure in the mask of up to 20.0 in H_2O at altitudes between 35,000 and 50,000 feet. The positive pressure increases as altitude increases. Miniature Oxygen Regulators can be used routinely up to approximately 43,000 feet, but due to human limitations, Miniature Oxygen Regulators shall not be used above 43,000 feet except for very short periods.

3-11. DILUTER DEMAND TORSO-MOUNTED OXYGEN REGULATORS. These Diluter Demand Regulators are torso-mounted, multi-purpose regulators. They are designed to provide 100% oxygen or an air-oxygen mixture at the correct ratio and pressure to the aircrewmember, depending on altitude and mode selection. The regulators incorporate a selector knob (or lever) for selecting the 100% OXYGEN, or DILUTER mode.

3-12. CONTINUOUS FLOW REGULATORS. Continuous Flow Regulators are used in a limited number of naval aircraft. These regulators do not satisfactorily meet all the oxygen requirements of varying degrees of aircrew activity. Continuous Flow Regulators are not authorized for use by aircrewmembers, but are authorized for passenger use.

Section 3-2. Oxygen Hazards, Safety, and Handling

3-13. GENERAL.

3-14. Personnel safety cannot be guaranteed. However, a high level of safety can be achieved if operating personnel have the proper attitude, understanding, and training. Safety regulations must be conscientiously practiced and rigidly enforced. It is the painful truth that many of these rules have been written because of the death or suffering of those who did not know them or chose to ignore them. The best assurance of personnel safety lies in the safety-education of the people themselves. If they can be made aware of the potential hazards and the means of protecting their own lives, most of them will respond in a responsible fashion. Responsibility for the safety of one's self and others cannot, however, be obtained solely with a set of written regulations. Responsibility is secured on an individual basis, in varying degrees, and is the framework for all safety-education. There would be little need for safety rules if everyone were extremely responsible and knowledgeable. Unfortunately, this is not always the case. A lack of maturity on the part of an individual, or a new or unfamiliar job assignment, working a manner contrary to the possession of such responsibility and knowledge. Safety rules, then, become a primary tool in securing safety-conscious, well-trained personnel. In many instances, safety-education is conducted on a haphazard basis and only taken seriously when required by top management. It is not uncommon for safety procedures to evolve following a serious accident which has caused injury or death. The safety of personnel can be almost assured only when there is thorough understanding of potential hazards, correct procedures and equipment are used, and the equipment is kept in good working condition.

3-15. Safety precautions presented in this Section shall be followed by all personnel responsible for handling liquid and gaseous oxygen. To ensure personal safety and the safe and efficient handling of liquid and gaseous oxygen, all personnel shall be thoroughly familiar with the hazards involved. All operations involving the handling of LOX shall be performed by two or more qualified persons, except the removal and replacement of aircraft LOX converters. The filling of LOX converters removed from the aircraft shall require two qualified persons. (Refer to Glossary for definition of Qualified Personnel.)

WARNING

Use only small amounts of oxygen cleaning compound at a time. Use in a well ventilated open space. Avoid prolonged breathing. Oxygen cleaning compound vapors are hazardous and can cause death if too much is inhaled.

NOTE

Personnel servicing gaseous oxygen systems or LOX converters and operating ground support equipment servicing and transfer units shall be qualified and licensed in accordance with OPNAVINST 4790.2 series.

1. All AIMD oxygen shops, ashore and afloat, shall have oxygen monitors installed to ensure oxygen content in the space is maintained at a safe level (both physiological and over-enriched). Most shops have new oxygen monitor models. However, some AIMD oxygen shops may still have older oxygen monitors installed which can remain in service until receipt of the new monitor. Contact CFA at NAWCAD Lakehurst, NJ for appropriate monitor settings. Refer to NAVAIR 06-30-501 for currently authorized oxygen monitor model numbers.

2. Quality Assurance Division shall audit the oxygen shop to ensure step 1 is complied with.

3-16. SAFETY PRECAUTIONS; OXYGEN CLEANING COMPOUND MIL-C-81302.

3-17. Oxygen cleaning compound may dilute or displace oxygen below levels necessary to sustain life. Low levels are especially susceptible to oxygen displacement. The following warning shall be displayed wherever cleaning compound MIL-C-81302 is used.

WARNING

Inhaling trichlorotrifluoroethane vapor can be fatal.

Vapor concentration, immediately dangerous to life, is almost odorless, colorless, and tasteless. It may cause impairment of manual dexterity and vigilance. Breathing high concentrations may cause death or serious physical harm. In case of spill, warn other personnel and evacuate immediately.

3-18. The following precautions shall be followed by all personnel handling cleaning compound, MIL-C-81302.

1. Avoid breathing vapors. Avoid skin and eye contact.

2. Use the least amount possible to perform the task.

3. Assure good ventilation to maintain vapor levels at an acceptable level.

4. Do not wear contact lenses when using MIL-C-81302 cleaning compound.

5. Wear safety goggles for eye protection.

6. First Aid. If required, perform the following first aid procedures as necessary:

a. In case of direct contact, remove contaminated clothing and wash involved skin with soap and water. Seek medical attention if irritation occurs.

b. In case of eye contact, flush with potable water for at least 5 minutes. Call a physician.

c. If inside, remove to fresh air. If not breathing, give artificial respiration preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician. Do not give epinephrine or similar drugs.

d. If ingested, do not induce vomiting.

NOTE FOR PHYSICIAN:

Trichlorotrifluoroethane has caused cardiac sensitization to epinephrine in experimental animals (dogs). Cardiac arrhythmia, including ventricular fibrillation, could occur if epinephrine or one of its congeners is administered to patients exposed to high concentrations of trichlorotrifluoroethane. Medical use of epinephrine or any of its congeners is contraindicated except for patients with no arterial perfusion.

3-19. GASEOUS OXYGEN HAZARDS.

3-20. Gaseous oxygen is extremely hazardous when used in the presence of readily combustible materials. Do not permit oil, grease, gasoline, kerosene, aviation fuel or any other readily combustible material to come in contact with oxygen.

3-21. GENERAL SAFETY PRECAUTIONS (GASEOUS OXYGEN).

3-22. The following safety precautions shall be followed by all personnel handling gaseous oxygen:

1. Only oxygen conforming to MIL-O-27210, Type I shall be used in aircraft gaseous oxygen systems.

2. Exercise care that compressed oxygen does not become contaminated in anyway with hydrogen, hydrocarbon gases, or oil base liquids as a serious explosion can result.

3. Oil or grease must never be allowed to come into contact with or be used in the presence of open cylinders, valves, regulators, gages or fittings. Fire or explosion may result.

4. Never lubricate oxygen valves, regulators, gages, or fittings with oil or any substance except an approved oxygen compatible lubricant, listed below.

Mil Spec	Description	NIIN
TYPE III	Krytox	
TYPE III	Tribolube	16

Specific lubricants approved for use with oxygen equipment are listed in the appropriate chapter of this manual describing specific oxygen equipment.

NOTE

Krytox and Tribolube shall not be used on aluminum or magnesium fittings in applications where shear stress would be encountered.

MIL-T-27730 Teflon tape shall be used specifically as a thread sealant.

MIL-M-7866 Molybdenum Disulfide shall be used on stainless steel flared fittings and on those applications where Teflon Type MIL-T-27730 cannot be used.

5. Hands should be clean and free from oil before using oxygen equipment; do not wear greasy gloves or clothing.

6. A spark is not necessary to cause a fire or explosion. The chemical reaction of having fuel gases and oils combine with oxygen is sufficient to develop spontaneous combustion, and could cause a fire or explosion.

7. Never permit oxygen cylinders to come into contact with electrical welding circuits or apparatus.

8. Do not allow sparks or flames from welding or cutting torch or any other source to contact cylinders.

9. Never use oxygen from a cylinder without reducing the pressure through a pressure reducing regulator.

10. Never mix other gases or compressed air in an oxygen cylinder.

11. Never test for pipe line leaks or blow-out pipe lines with oxygen unless lines are specifically made and

cleaned for oxygen use. Use water-pumped nitrogen, which does not support combustion, for this purpose. Pipes, pipe threads, and other pressure containers are sometimes greased or oiled. Using compressed oxygen for the general purpose of testing for leaks is extremely dangerous and almost certain to cause a violent explosion.

12. To aid in preventing leakage or material failure due to overtorque of gaseous oxygen system tubing and fittings, strict adherence to torque values listed in table 3-1 is mandatory.

13. Do not confuse air with oxygen. Oxygen is one of several elements contained in air and should always be described by its proper name. Any attempt to use oxygen in place of compressed air may result in an accident. Never use oxygen for pneumatic tools, for starting diesel engines, as a pressure agent in oil reservoirs, for paint spraying, or for any use other than breathing, welding, or cutting.

14. Aviator's breathing oxygen supply cylinders can be readily identified by their green color and 3-inch wide white band around the upper circumference of the cylinder. OXYGEN, AVIATOR'S shall be stenciled in white parallel to the longitudinal axis and on diametrically opposed sides in letters 1 3/4 to 2 inches high.

15. Before connecting oxygen cylinders to oxygen systems, be sure that each cylinder is properly and correctly identified as containing aviator's breathing oxygen.

16. Never pressurize an oxygen system without the proper adapter and safety disc installed on the transfer line.

17. The amount of oxygen in a cylinder is determined by pressure.

18. Under no circumstances shall carbon tetrachloride or similar cleaning fluids be used. Minute quantities of these materials will contaminate the oxygen supply.

19. Do not clean any elastomer parts (rubberized) that have become contaminated with oil or grease. All such parts shall be replaced.

20. Prior to using leak detection compound (MIL-L-25567, Type 1), inspect carefully. Compound which is not clear and free from suspended material sediment is considered contaminated and shall be disposed of. Compound exhibiting peculiar odors such as acetone or alcohol is considered contaminated and shall be disposed of.

21. Use leak detection compound (MIL-L-25567, Type 1) sparingly as any solution entering oxygen equipment will contaminate the system. Remove all traces of the compound after test with a clean, damp, lint-free cloth.

22. The pressure in oxygen storage cylinders which service/replenish aircraft oxygen supply cylinders should not fall below 50 psig. Keep valve closed when not in use. Oxygen cylinders depleted to a pressure of approximately 50 psig shall be marked "EMPTY," tagged appropriately, and stored separately from charged oxygen cylinders. All cylinders which have a pressure below 15 psig shall be removed from service for vacuum and heat drying/hot nitrogen gas drying (MIL-STD-1411/MIL-STD-1359).

NOTE

A full oxygen cylinder is a cylinder which is charged to its rated pressure. With respect to a high pressure oxygen cylinder, 1800 psig is considered full.

To refill is to recharge a cylinder, regardless of the residual pressure remaining within the cylinder.

Cylinders that are less than 2 inches in outside diameter and less than 2 feet long do not require a hydrostatic retest.

Hydrostatic test interval for P-3 fixed installed oxygen cylinders (P/N 1084-514), shall not exceed eight years.

Low Pressure Oxygen Cylinders, Type MS21227-1 used on MA-1 Portable Emergency Oxygen System, do not have a Department of Transportation (D.O.T.) ICC number permanently stamped in the neck of the cylinder and therefore do not require hydrostatic testing. These cylinders are painted yellow in accordance with MIL-STD-101.

23. Never refill an oxygen cylinder that has gone beyond its hydrostatic test date (5 years after last test date stamped on cylinder shoulder). As long as the cylinder is full, it may remain in service.

24. Do not confuse aviator's breathing oxygen with welding or hospital oxygen. The latter types of oxygen usually have a moisture content that would freeze and plug the lines and valves of an aircraft oxygen system.

25. Leave cap on cylinder when not in use to protect valve. A broken valve may cause a cylinder to rocket like a torpedo, and could cause serious injury or death.

26. Before opening an oxygen cylinder valve, ensure cylinder is firmly supported. Cylinder valves are to be closed by hand only. If valve cannot be fully closed by hand, it shall be returned with cylinder for repair. A protective cap shall be installed on the valve of any cylinder not in use.

27. Open valves slowly, rapid surges in pressure can damage sensitive equipment and cause extreme temperature rise in small orifices and components.

28. Use existing or formulate charging stages when refilling oxygen cylinders and systems. Rapid pressurization creates heat which can result in fire or explosion.

WARNING

Wire-wrapped cylinders have wire-wrapping removed prior to hydrostatic testing; cylinders passing the hydrostatic test must be rewound prior to placing back in service.

NOTE

Not all cylinders require wire-wrapping. Wire wrapping is not required on 96 cubic inch cylinders manufactured under contracts N00363-78-M-7383 and N00383-77-C-2908.

29. Remove emergency oxygen cylinders or walk around bottles from aircraft for servicing.

30. Never fill aircraft systems without using a pressure reducing regulator. Aircraft have been demolished by failure to observe this precaution.

31. Ensure all oxygen equipment left outdoors is sheltered from the elements.

32. NAVSUPINST 4440.128 Series contains instructions for storage, handling and hydrostatic testing intervals for compressed gases and gas cylinders.

3-23. LIQUID OXYGEN HAZARDS.

3-24. The potential hazards associated with the handling of liquid oxygen are due to its extremely cold temperature, rapid expansion upon conversion to gas at ambient (room) temperature, and its reactivity with any organic matter or flammable substance with which it comes it contact.

3-25. FREEZING. Because liquid oxygen has an extremely low temperature, it can freeze or seriously damage skin tissue upon contact. The effect is similar to frostbite or thermal burn. Use extreme caution when filling a warm container because vigorous boiling, splashing and evaporation will occur.

3-26. Metals and similar materials cooled by liquid oxygen may freeze to the skin upon contact. Flesh can be badly burned or torn in an attempt to free it. Always assume that frosted or uninsulated parts of liquid oxygen equipment are approximately -297°F (-182.7°C). Refer to Section 3-3 for protective clothing requirements.

3-27. FIRE AND EXPLOSION. Always handle liquid oxygen in well-ventilated areas. Never dispose of liquid oxygen in confined spaces. If liquid oxygen is spilled on a combustible substance, the substance will burn with great intensity if ignited.

3-28. Do not allow any organic matter or flammable substance to come in contact with liquid oxygen. Some of the materials that may react violently with oxygen under the right conditions of temperature and pressure are oil, grease, dirt containing oil or grease, tar, cotton, lamp black, coal dust, asphalt, gasoline, kerosene, JP fuel, propane, butane, naphtha, alcohol, ether, aniline, benzene, hydrogen, illuminating gas, acetylene, paint, sugar, sulfur, cloth and wood. If exposed to liquid oxygen, organic materials (such as those listed previously) will burn violently when ignited. All combustibles are potential explosion hazards when mixed with liquid oxygen. Mere mixture of liquid oxygen with powdered organic materials under certain conditions may cause explosion. If the vapor from liquid oxygen mixes with fuel vapor in the right proportions, the mixture will explode if ignited. Every fire involving liquid oxygen must therefore be regarded as an explosion hazard.

3-29. PRESSURE EXPLOSION. If liquid oxygen is vaporized and warmed to ambient temperature, one volume of liquid oxygen will expand to 862 volumes of gaseous oxygen. If this evaporation and expansion takes place in a confined space, explosive pressures in excess of 12,000 psig will be created. For this reason, all storage containers must be provided with pressure relief devices, unless the container is so vented that gas cannot be entrapped. All lines and equipment in which liquid may be trapped between closed valves must be equipped with pressure relief valves. All pressure relief valves and rupture discs must be placed and protected so that water cannot splash or condense upon them. Relief valves must be checked periodically to ensure that they are in proper operating condition.

3-30. GENERAL SAFETY PRECAUTIONS (LIQUID OXYGEN).

3-31. The following safety precautions shall be followed by all personnel handling liquid oxygen:

WARNING

Do not service LOX converters in an unsheltered area during inclement weather (rain, snow etc). Moisture can easily enter the vent port of the fill buildup vent valve and supply manifold. Moisture will freeze immediately upon contact with liquid oxygen rendering pressure closing or relief valve or both inoperative. This situation, if undetected, will lead to critical over pressurization and explosion of LOX converter:

LOX converters shall be drained in a well ventilated, clean area with limited access and protection from inclement weather so designated by type commanders or NAVSEA. A drip/drain pan with sides at least 6 inches high and free from dirt, grease, oil, fuel, hydraulic fluid, and other hydrocarbons, shall be used when draining LOX converters. Two qualified persons shall be present when draining LOX converters, one of which will be designated safety observer. A maximum of two LOX converters can be drained at one time.

1. Only liquid oxygen conforming to MIL-O-27210, Type II shall be used in aircraft liquid oxygen systems.

2. When transferring liquid oxygen or converting liquid oxygen to gaseous oxygen, the safety precautions pertaining to the handling of both liquid oxygen and gaseous oxygen apply.

3. Do not operate liquid oxygen equipment unless you are qualified or are working under the supervision of qualified personnel.

4. Wear goggles or a face shield when handling liquid oxygen.

5. Do not handle with bare hands any tubing or fittings through which liquid oxygen is flowing. Wear clean, dry gloves when handling parts of equipment cooled by liquid oxygen.

6. A rubber coated, cotton duck, impermeable apron shall be worn when working with liquid oxygen. The apron should be tied or secured in a fashion that would make it easy to remove in an emergency.

7. Cuffless coverall shall be worn. The coverall shall be worn over the gloves and the top of shoes, so that in the event of LOX spillage, the LOX will roll off the clothing and not become trapped in the gloves or boots.

8. Approved type liquid oxygen boots shall be worn.

9. In the event of accidental contact with liquid oxygen, quickly thaw the exposed area, preferably by immersion or by bathing area with large amounts of water. After the rapid thaw, wrap the exposed area loosely with clean dry dressing and report to a doctor immediately. Do not apply anything else to the affected area other than the clean dry dressing.

10. Do not permit smoking, open flames, or sparks in the liquid oxygen handling areas.

11. Do not carry matches in liquid oxygen handling areas.

12. Ensure all liquid oxygen equipment left outdoors is sheltered from the elements.

13. Keep work area and equipment free of oil, grease or any other combustible material.

14. Keep tools and clothing free of oil and grease.

15. Avoid spilling liquid oxygen on floor or deck areas. In case of accidental spillage, thoroughly ventilate the area.

16. Always call oxygen by its proper name. Do not confuse it with compressed air. Never use oxygen in place of compressed air for any purpose.

17. Handle converters, storage tanks and transfer hoses with care to avoid damage to the insulating space.

18. (Essex GCU-24/A Only) Prior to filling converter, inspect safety wire and Glyptal dots on relief valve and pressure closing valve for security.

19. When transferring liquid oxygen, do not leave valves open all the way. Open valves wide, and then immediately close them about one quarter turn; otherwise they may freeze in the open position.

20. Disconnect filling or transfer lines as soon as the transfer process is completed.

21. Do not leave liquid oxygen in a closed container, or trapped in a line between two valves; always open a valve on one end to avoid excessive pressure buildup.

22. Use only standard approved equipment in the handling and storage of liquid oxygen.

23. Do not introduce moisture into the system. Exercise care to ensure that no moisture is present on filler valve nozzles when they are connected or disconnected.

24. Purge piping and equipment with oil-free nitrogen, Type I, Class 1, Grade B, (Fed Spec BB-N-411).

25. To aid in preventing leakage or material failure due to over-torquing of liquid oxygen system tubing and fittings, strict adherence to torque values listed in table 3-1 is mandatory.

26. For additional precautions and information, refer to Technical Manual of Oxygen/Nitrogen Cryogenic Systems (NAVAIR 06-30-501).

3-32. (Converters Permanently Installed in Aircraft) Before recharging an aircraft liquid oxygen system with the converter installed, take the following precautions in addition to those already indicated. Ensure that:

1. The aircraft is in an open ventilated area.

2. The aircraft is not being fueled.

3. The aircraft is static grounded.

4. The aircraft electrical system is OFF.

5. No APUs or starting units are connected to the aircraft or are operating in the vicinity.

6. A CO_2 fire extinguisher is immediately available.

7. Personnel are kept clear of the aircraft overboard vent.

8. The deck under and in the immediate vicinity of the overboard vent is free from grease, oil, or any other combustible material.

9. A stainless steel, aluminum or copper drip pan is placed beneath the aircraft overboard vent.

3-33. (Converters Incorporating a Quick-Disconnect Mounting Plate) Converters shall be removed from aircraft prior to any servicing.

3-34. SAFETY PRECAUTIONS ABOARD SHIP. In addition to the general safety precautions, all personnel aboard ship shall follow these additional safety precautions:

Table 3-1. Torque Values for Tubing and Fittings

Torque Requirements for Flared Tube Connections (Aluminum)		
Tubing O.D. (inches)	Minimum Torque (pound-inches)	Maximum Torque (pound-inches)
5/16	100	125
3/8	200	250
1/2	300	400
Notes: 1. Standard straight tapered pipe thread fittings have no torque values. Tape the pipe threads with two turns of teflon tape and install the fitting finger tight. Then attach wrench and tighten one to two turns maximum.		

WARNING

LOX converters shall be drained in a well ventilated, clean area with limited access and protection from inclement weather so designated by type commanders or NAVSEA. A drip/drain pan with sides at least 6 inches high and free from dirt, grease, oil, fuel, hydraulic fluid, and other hydrocarbons, shall be used when draining LOX converters. Two qualified persons shall be present when draining LOX converters, one of which will be designated safety observer. A maximum of two LOX converters can be drained at one time.

1. When smoking or when carrying an open or unshielded light or any potential spark-producing apparatus, do not enter an oxygen storage compartment. Do not approach any point where oxygen is being discharged or where there is a suspected leak in piping.

2. Exercise care in handling ammunition near oxygen.

3. Keep open flames at last 100 feet away from oxygen storage tanks or oxygen equipment.

4. Oxygen storage and handling compartments shall be sprayed with one coat of fire-resistant paint before being used. However, first remove any other existing paint from plant and equipment and thoroughly clean them to bare metal.

5. Do not permit painting when liquid oxygen is contained in the compartment.

6. During transfer operations, position the transfer trailer so that it will not shift with the pitch and roll of the ship. Lock the brakes and tie down the trailer.

7. Do not drain or vent oxygen in a closed compartment.

8. During transfer operations keep work area, equipment, tools, and clothing free from oil, grease of other hydrocarbon points.

9. Post LIQUID OXYGEN signs in a conspicuous place on all storage tanks, compartments, and handling rooms. Post CAUTION and NO SMOKING signs at entrances and hazardous points.

10. When liquid oxygen piping is not enclosed in a double wall or flame tight casing, post NO SMOKING signs in the compartments containing the piping.

3-35. STORAGE.

3-36. Liquid oxygen storage containers must be protected from excessive heat and direct rays of the sun. Liquid oxygen containers must be stored apart from containers of other gases or liquids and must not be stored within 50 feet of flammable material of any kind. Never transfer liquid oxygen in or around areas in which odors of any type may be absorbed by the liquid.

3-37. All storage containers must be provided with pressure-relief devices. These pressure-relief devices shall be checked periodically to ensure that they are in proper operating condition.

3-38. Oxygen must not be stored or used near flammable material or any substance likely to start or accelerate fire. Oxygen is not flammable, but supports combustion intensively. Store at least 50 feet from combustible materials.

3-39. Oxygen cylinders must not be stored with hydrogen or other combustible gas cylinders in an unventilated place. If stored inside, they shall be separated by a fire-resistant wall.

3-40. Do not store oxygen cylinders, LOX converters and apparatus under moving machinery, cranes, belts, or where exposed to residue from stack gasses. Oil and grease may drop and cause explosion, fire or contamination.

3-41. Gaseous and liquid oxygen servicing trailers can be stowed or parked inside enclosed buildings or hangars provided those spaces are constructed of concrete or steel and meet minimum ventilation requirements. Gaseous or liquid oxygen servicing trailers shall not be stowed or parked in enclosed wooden buildings. If approved stowage or parking facilities are not available, servicing trailers must be stowed or parked in a covered lean-to enclosed on three sides only. The lean-to should be positioned a minimum of 50 feet from traveled roadways, parking areas, and wooden structures.

3-42. LOX CONVERTER STORAGE. Liquid oxygen converters stored outdoors must be sheltered from the elements (e.g., direct rays of the sun, rain, snow, etc.), as moisture can easily enter vent or supply couplings. The moisture when frozen can render the presure closing valve or relief valve inoperative; this canlead to overpressurization and explosion of the LOX converter.

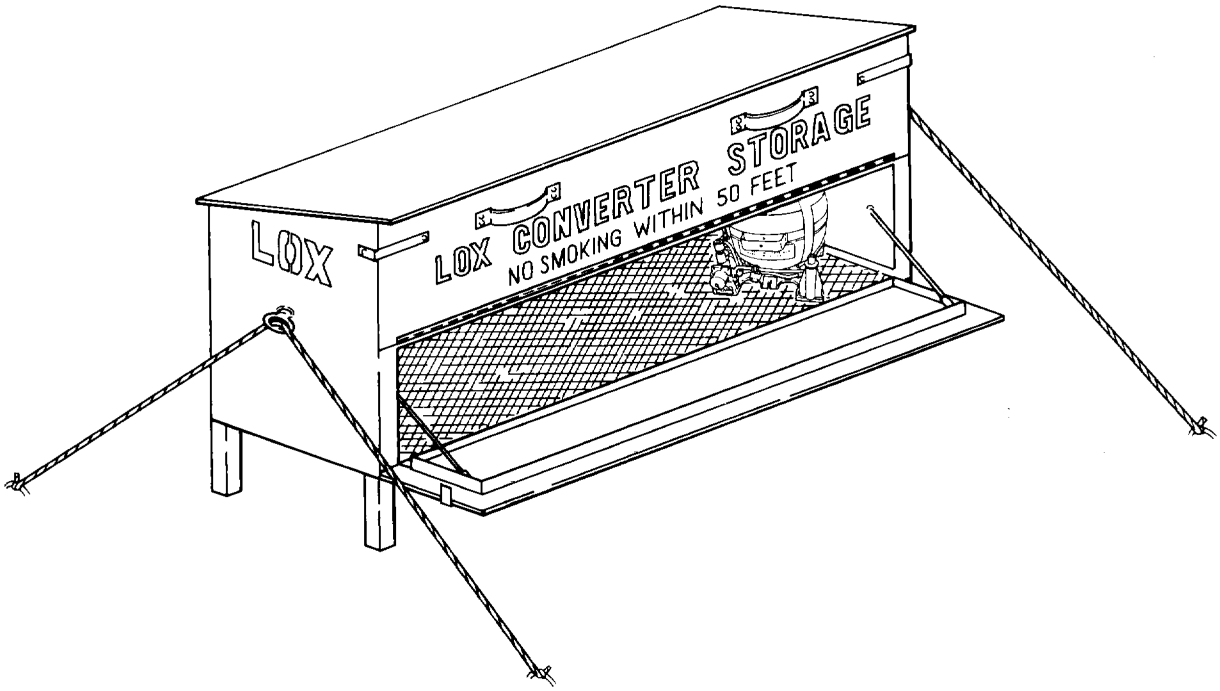

Figure 3-1. Liquid Oxygen Converter Storage Shelter

3-43. Protective shelters shall be provided for LOX converters which are stored outdoors (figure 3-1). Protective shelters may be locally manufactured to suit individual activity requirements. Protective shelters shall be manufactured according to these requirements:

1. Shelters must be well ventilated to prevent the buildup of potentially dangerous concentrations of oxygen.

2. Shelters must be constructed of noncombustible materials.

3. All shelves must be constructed of expanded stainless steel wire mesh or other perforated material to provide adequate ventilation.

4. Shelves shall be no less than 17 inches high. The shelf depth shall be no less than 18 inches. The length shall be determined by the number of converters to be stored, leaving 18 inches or more for each converter. The bottom shelf must be a minimum of 10 inches above the ground.

5. Shelters shall be painted white and marked “LOX CONVERTER STORAGE” using green reflective tape L-S-300B. Letters shall be no less than 4 inches high. In addition the warning “NO SMOKING WITHIN 50 FEET” shall be marked on the shelter using red reflective tape L-S-300B. Letters shall be no less than 2 inches high.

6. The shelter shall be provided with eyebolts or handles to provide a four-point tiedown.

Section 3-3. Protective Clothing

3-44. GENERAL.

3-45. Because of the hazards associated with handling liquid oxygen, it is imperative that all personnel working with liquid oxygen wear protective clothing.

3-46. The following is a list of approved protective clothing and authorized allowance that can be used when working with liquid oxygen:

Support Equipment Required

Quantity	Description	Reference Number
1 ea per individual	Apron, Impermeable, Cotton Duck, Rubber Coated	MIL-A-41829 (CAGE 81349) NIIN 00-082-6108
1 ea per individual	Face shield, Industrial, Style B	L-F-36 (CAGE 81348) NIIN 00-202-9473
2 ea per individual	Coveralls, Explosive Handlers	MIL-C-14610 (CAGE 81349)
	X-Small (32-34)	NIIN 00-279-2455
	Small (36-38)	NIIN 00-279-8719
	Medium (40-42)	NIIN 00-279-8720
	Large (44-46)	NIIN 00-279-8721
	X-Large (48-50)	NIIN 00-279-8722
1 ea per individual	Shoe, Molders	MIL-S-82245 (CAGE 81349)
	7D	NIIN 00-926-9965
	7EE	NIIN 00-926-9966
	8D	NIIN 00-926-9967
	8EE	NIIN 00-926-9968
	9D	NIIN 00-926-9969
	9EE	NIIN 00-926-9970
	10D	NIIN 00-926-9971
	10EE	NIIN 00-926-9972
	11D	NIIN 00-926-9973

Support Equipment Required (Cont)

Quantity	Description	Reference Number
	11EE	NIIN 00-926-9974
1 pr per individual	Gloves, LOX Servicing (Note 1)	(CAGE 65370)
	Medium	LOX-MIL-M
	Large	LOX-MIL-L
	X-Large	LOX-MIL-XL

Notes: 1. LOX Servicing Gloves are not currently stocked in the Navy Supply System and must be ordered Open Purchased from the following vendor:
Tempshield Inc.
23 Industrial Way
Trenton Business Park
Trenton, Maine 04605
TEL: (800) 680-2796

1. Face Shield/Safety Goggles. Eye protection shall be worn at all times when working with liquid oxygen. When working in confined areas or overhead, wear face shield or safety goggles to protect the eyes. Safety glasses with side shields may also be used.

2. Always wear LOX Servicing gloves when handling any equipment that is or may have been in recent contact with liquid oxygen. Gloves shall be loose fitting so that they can be quickly removed if LOX gets into them. In addition use protective gloves when handling purging units.

3. Coverall, explosive ordnance handlers, cotton sateen, fire resistant shall be used by liquid oxygen handlers. Cuffless sleeves and trouser legs shall be worn over the top of gloves and shoes.

4. Apron, impermeable, cotton duck, rubber coated, shall be worn when working with liquid oxygen. The apron shall be tied or secured in a fashion that would make it easy to remove in case of an emergency.

5. Shoes, LOX boots (shoes, safety, molders, congress style, black) a type that can be easily removed, shall be worn when working with liquid oxygen.

6. Clothing that is splashed by liquid oxygen shall be removed immediately and thoroughly aired for at least 1 hour.

Section 3-4. Aircraft Oxygen System Requirements

3-47. GENERAL.

3-48. Aircraft oxygen systems shall be purged when the system is left open to the atmosphere, when empty, or whenever contamination is suspected.

3-49. When maintenance action involves the removal and reinstallation of connecting hardware without a change in adjustment or alignment to the system, a thorough ground functional check shall be conducted prior to the aircraft being released for flight. (Refer to OPNAVINST 4790.2 Series.)

WARNING

Only clean plastic caps or plugs (MIL-C-5501) shall be used to close oxygen system openings. Under no circumstances will tape, rags, or paper be used to close openings created by removal of components.

3-50. When an aircraft oxygen system is opened for the removal/replacement of any component, all openings created shall be immediately plugged or capped to prevent entrance of moisture or contaminants.

3-51. PURGING OXYGEN SYSTEMS.

3-52. The following Materials Required, Support Equipment and procedures shall be followed when purging oxygen systems:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Gas/LOX Purging Unit, Model A/M26M-3	3447AS100-1

3-53. PURGING LOW-PRESSURE OXYGEN SYSTEMS. Low-pressure gaseous oxygen systems shall be purged by one of the following methods:

1. Aircraft having filler and distribution lines connected to the same end of the cylinder shall be purged by charging the system with gaseous oxygen; then by depleting. Perform this procedure a minimum of three times.

WARNING

Use only oil-free nitrogen, Type I, Class 1, Grade B for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

2. Aircraft having the filler valve connected to one end of the cylinder and distribution lines to the opposite end (i.e., continuous flow system) shall be purged as follows:

a. Connect purging unit (P/N 3447AS100-1) to aircraft filler valve.

b. Disconnect regulator distribution line(s) at regulator(s) to permit a flow.

c. Pass heated oil-free nitrogen through system at maximum pressure of 120 psig and a minimum temperature of 90°F for 30 minutes. Create a flow through the system. This can be accomplished by various methods, depending on the type of aircraft system. Consult the applicable aircraft MIM for detailed instructions. If moisture or contaminants are still present, repeat purge as required.

d. Disconnect purging unit. Reconnect regulator(s) and recharge system with oxygen.

e. Drain system through regulator(s) to remove any residual nitrogen.

f. To complete purge, recharge system with oxygen.

3-54. PURGING HIGH-PRESSURE OXYGEN SYSTEMS. Two factors must be considered when purging high-pressure oxygen systems: purging for the removal of contamination or purging for the removal of moisture.

3-55. To purge a high-pressure oxygen system of contamination, proceed as follows:

NOTE

It can never by certain that moisture is not present. Therefore, the following purge procedures should only be used in emergency situations where the procedures outlined in paragraph 3-56 can not be accomplished.

1. Charge system with gaseous oxygen; then drain system through regulator(s).

2. Repeat step 1 a minimum of two times.

3. To complete purge, recharge system with oxygen.

3-56. To purge a high-pressure oxygen system of moisture, proceed as follows:

WARNING

Cylinders which have been open to the atmosphere and voided of oxygen (to less than 15 psig) shall be removed from service for vacuum and heat drying/hot nitrogen gas drying (MIL-STD-1411 and MIL-STD-1359A) before recharging.

Use only oil-free nitrogen, Type I, Class 1, Grade B (Fed Spec BB-N-411) for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

1. (Manually Operated Cylinder Valve) Close cylinder valve; disconnect supply line at cylinder.

2. (Automatic Opening Cylinder Valve) Disconnect supply line at cylinder.

3. Disconnect regulator distribution line(s) at regulator(s) to permit a flow.

4. Connect purging unit (P/N 3447AS100-1) to aircraft filler valve and pass a flow of heated oil-free nitrogen (Fed Spec BB-N-411) through system at maximum pressure of 120 psig and a minimum temperature of 90°F for 30 minutes. Create a flow through the system. This can be accomplished by various methods, depending on the type of aircraft system. Consult applicable aircraft MIM for detailed instructions. If moisture or contaminants are still present, repeat purge as required.

5. When purging is completed, disconnect purging unit, reconnect all lines, and open cylinder valve (if applicable).

6. Functionally test system in accordance with applicable Maintenance Instruction Manuals (MIMs).

3-57. PURGING AIRCRAFT LIQUID OXYGEN SYSTEMS. To purge aircraft liquid oxygen systems, proceed as follows:

WARNING

Use only oil-free nitrogen, Type I, Class 1, Grade B (Fed Spec BB-N-411) for purging oxygen systems. The use of aircraft nitrogen servicing trailers for purging oxygen systems is strictly prohibited. For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

1. Disconnect and, if necessary, remove LOX converter.

2. Connect purging unit (P/N 3447AS100-1) to aircraft system supply quick-disconnect.

3. Create a flow at user end of system. This can be accomplished by various methods, depending on type of aircraft system. Consult applicable MIM for detailed instructions.

4. Pass heated oil-free nitrogen (Fed Spec BB-N-411) through system at maximum pressure of 120 psig and a minimum temperature of 90°F for 30 minutes. If contaminants are still present, repeat purge as required.

5. When purging is completed, disconnect purge unit. Reconnect aircraft system supply quick-disconnect to LOX converter.

6. Fill aircraft system if applicable. Functionally test system in accordance with applicable MIM.

3-58. LOX CONVERTER MAINTENANCE.

3-59. QUICK-DISCONNECT CONVERTERS. A Calendar Inspection, consisting of a Visual Inspection followed by a Bench Test, shall be performed on all LOX converters incorporating a quick-disconnect mounting plate prior to being placed in service, and at intervals not exceeding 231 days thereafter. The Calendar Inspection shall be performed in accordance with the chapter in this manual, or the technical manual pertaining to the specific type and part number LOX converter to be serviced. These converters shall be removed from aircraft prior to servicing.

3-60. PERMANENTLY INSTALLED CONVERTERS. A Calendar Inspection shall be performed on all permanently installed LOX converters in accordance with the technical manual pertaining to the specific type and part number LOX converter to be serviced. These converters shall undergo bench testing during the Standard Depot Level Maintenance (SDLM) of the aircraft in which it is installed.

3-61. PURGING LOX CONVERTERS. LOX converters shall be purged when they have been emptied, or whenever moisture or contamination is suspected. Purging shall also be performed upon completion of any maintenance action which causes the system to be open to the atmosphere. In no case shall purge interval exceed 231 days. Purging of LOX converters shall be performed in accordance with the applicable chapter of this manual. To purge LOX converters not included in this manual, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	59A120-D5-46
1	Gas/LOX Purging Unit, Model A/M26M-3	3447AS100-1

WARNING

Liquid oxygen converters shall be emptied of LOX and allowed to warm to ambient temperature prior to purging.

1. Connect purging unit to vent port of fill, buildup, and vent valve.

2. Attach adapter assembly to fill port of fill, buildup, and vent valve. Turn knurl knob clockwise until it seats and then back out counterclockwise two complete turns.

3. Attach converter drain line to converter supply quick-disconnect coupling.

NOTE

For ARO Corporation converter P/N 21170-10/-13 remove relief valve tubing and cap the two fittings that tubing was removed from.

4. Pass heated oil-free nitrogen through the converter at a pressure of 120 psig and a minimum discharge temperature of 90°F. Duration of purge is dependent on converter type. Purge duration is as follows:

NOTE

For converters that indicate internal probe shortage it may be necessary to purge the converter for a longer period of time.

a. Essex Industries Inc. converters P/N 10C-0016-10A and 10C-0016-16 and Bendix Corporation P/N 29073-D2, 3263004-0201, and 3263006-0101 which are at ambient temperature shall be purged for a period of 30 minutes.

b. ARO Corporation converters P/N 21170-10/-13 which are at ambient temperature shall be purged for a period of 60 minutes.

5. When purging is completed, disconnect purging unit and bench test the converter.

Section 3-5. Oxygen System Components Maintenance Shop

3-62. GENERAL.

3-63. During the evolution of cleanliness requirements for oxygen systems, additional requirements have been generated. This has occurred partly because applications vary in scope from industrial use with the least stringent requirements, to manned space vehicles with the most demanding requirements. The major difference between aerospace cleanliness and industrial cleanliness is that the former eliminates airborne contaminants. Therefore, the aerospace industry requires particle count, white rooms and deionized water. These tiny particles are not considered significant contaminants by the oxygen industry. The exclusion of airborne particles is an extremely costly process requiring pressurized rooms, expensive filtration equipment and elaborate procedures. The AIMD/depot level cleanliness standards need not be of clean room quality, but an enclosed, air-conditioned clean area, segregated from contaminant-producing operations shall be considered adequate.

3-64. Shore-based operational facilities shop design criteria are presented is the Naval Facilities Engineering Command Design Manual (NAVFAC DM-24). Deviations from NAVFAC DM-24 shall not be made without prior approval of Naval Facilities Engineering Command Headquarters (NAVFAC HQ). See figure 3-2 for typical shore-based facility.

3-65. The climate control system must be able to maintain a temperature of 65° to 75°F. Oxygen facilities without LOX generating equipment may be heated by unit heaters (steam), or direct-fuel heaters employing an air distribution duct system, providing the heating unit is not located in the transfer shop. Oxygen facilities with Lox generating equipment may be heated by a central heating plant, or by electric heat. Open-fired heaters shall not be used.

3-66. VENTILATION.

3-67. All air supplied to a shop where gaseous or liquid oxygen/nitrogen is transferred from one unit to another shall be exhausted directly to the atmosphere. Under no circumstance shall the exhaust air be returned to the oxygen/nitrogen transfer area.

3-68. Ventilation shall be provided in LOX converter and oxygen components shop to prevent accumulation of potentially dangerous concentrations of oxygen or nitrogen. Mechanical exhaust fans capable of providing a minimum of 3 air changes per hour shall be used as a positive means of exhausting the air. Although oxygen is about 10 percent denser than air, it is not necessary to evacuate the air near the floor because oxygen rapidly diffuses into air.

3-69. Ventilation requirements for oxygen shops aboard ship that support OBOGS systems only, require only 2.0 air changes per hour. However those spaces must meet required safety standards when working with hazardous materials such as oxygen cleaning compound (MIL-C-81302), toluene, acetone and other materials associated with the repair and cleaning of OBOGS components.

3-70. ELECTRICAL.

3-71. All electrical wiring and electrical equipment shall be in accordance with NAVFAC Specification 9Y (latest revision). The following information has been extracted from this specification:

1. Rigid conduit shall be used in wiring installations.

2. Electrical receptacles on the outside of buildings shall be weatherproof, 250V ac, 20 ampere (minimum), 3-wire grounding-type, and shall be furnished with plugs. Receptacles shall be connected to 220V ac, single phase service.

3. Lighting fixtures may be standard type, except that where exposed to mechanical damage, a suitable guard or cover shall be provided.

4. Switches and motor starting shall be enclosed and of the general use type.

5. Motors shall be of a type that do not have arcing or contact making parts. Three-phase motors of squirrel cage type shall be used wherever possible.

6. All equipment shall be static-grounded.

7. Transformer banks shall be located a minimum of 50 feet from transfer shop or LOX storage tank areas.

3-72. INTERIOR FINISHING AND FIXTURES.

3-73. FLOORS. In shops where gaseous oxygen transfer operations are conducted, a concrete floor or vinyl-type floor covering is considered adequate. In shops where LOX transfer operations are conducted, the floor shall be concrete. Non-glazed, or rough-glazed ceramic tile is also a suitable floor finish.

3-74. WALLS. The walls shall be finished with a smooth, impact-resistant, non-chipping, non-flaking material.

3-75. CEILINGS. The ceilings shall be easily cleanable, non-dust accumulating acoustical-type material.

3-76. WORK BENCHES, TABLES AND STORAGE BINS. Work benches and table tops shall be of seamless, non-porous material free of hydrocarbon finishes. Color shall be in contrast to walls and ceilings to minimize eye fatigue. Storage bins shall not contain more than the required parts to maintain an orderly production rate. Work benches, tables and storage bins shall be maintained free of grease, oil and other combustible materials.

3-77. TOOLS.

3-78. All tools and equipment shall be maintained free of grease, oil and other combustible materials. Tools used on oxygen equipment shall not be used for any other purpose. Tools shall be marked OXYGEN USE ONLY, or other suitable methods of identification may be used.

3-79. WORK AREA CLEANLINESS.

3-80. Work areas shall be kept clean at all times. Dust and dirt removal shall be accomplished by a vacuum system at any time that dust is evident at any location in the work area. Damp mopping will be used to follow up the vacuum cleaning for dirt and dust removal. Heel and chair marks or other discolorations of the floors shall be removed by scrubbing. All spare parts shall be removed from the work benches or covered with a lint free covering at the end of the last work shift each day. Work benches and test equipment will be wiped clean prior to the start of each work day. Smoking, refreshments, or lunch containers of any kind shall not be permitted in the work area. Only ball type pens are permitted for use in the shop (no lead or erasures).

3-81. PERSONAL CLEANLINESS.

3-82. Solvent contact with the skin should be avoided where possible. Finger nail polish shall be removed prior to entering shop. Cosmetics and medication which may produce contamination shall not be worn by any personnel. In particular, eye makeup, rouge, face powder and hair spray shall be avoided. Under no conditions will makeup be applied in the shop area. Personnel with skin and/or upper respiratory diseases shall not be allowed to work in the overhaul shop area. Personnel with colds, temporary coughing, sneezing and severe sunburn shall be assigned temporary jobs outside the shop until they are sufficiently recovered.

3-83. QUALITY ASSURANCE.

3-84. Long, trouble-free service can only be expected when cleanliness in the shop is maintained. Frequent Quality Assurance inspections are required to ensure proficiency in work performed by shop personnel, and that cleanliness is maintained.

3-85. TRAINING.

3-86. Shop supervisors shall be responsible for conducting a continuing training program stressing the significance of oxygen system cleanliness, personal cleanliness and the oxygen safety program. Conscientious adherence to all cleanliness requirements and safety regulations shall be observed at all times.

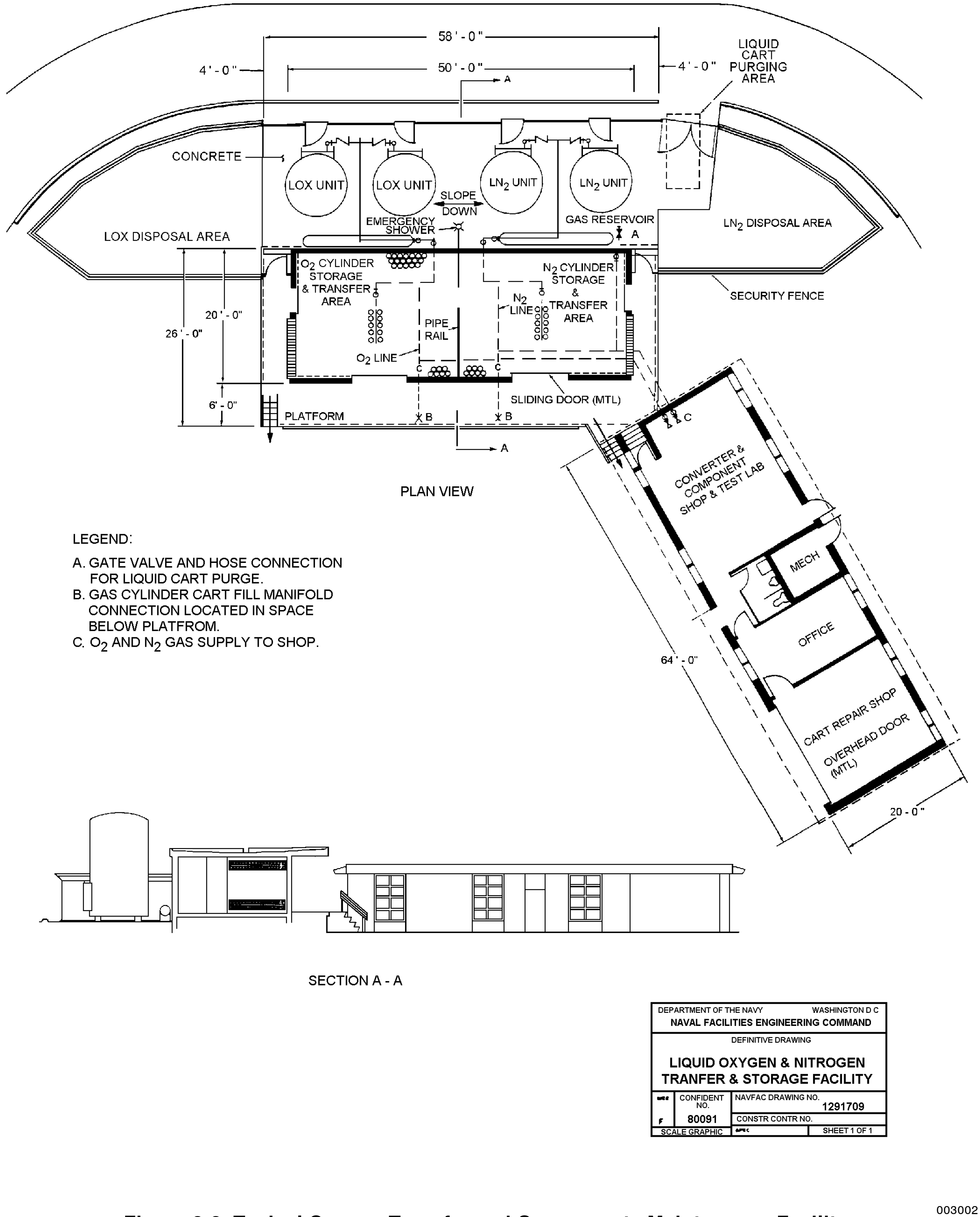

Figure 3-2. Typical Oxygen Transfer and Components Maintenance Facility

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CHAPTER 4

OEAS OXYGEN CONCENTRATOR

TYPE GGU-7/A, P/N 3261009-0105

EFFECTIVITY: THIS CHAPTER IS TO BE USED ONLY WHEN USING MODIFIED TEST SETS, TTU-452A/E OR TTU-518A/E.

Section 4-1. Description

4-1. GENERAL.

4-2. The Oxygen Enriched Air System (OEAS) Oxygen Concentrator, Type GGU-7/A, P/N 3261009-0105 (figure 4-1), is manufactured by Litton Life Support, formerly Clifton Precision. The concentrator is designed to provide a supply of breathing oxygen for two aircrewmember's open loop breathing schedules up to 50,000 feet. Table 4-1 contains the leading particulars for the OEAS oxygen concentrator.

4-3. CONFIGURATION.

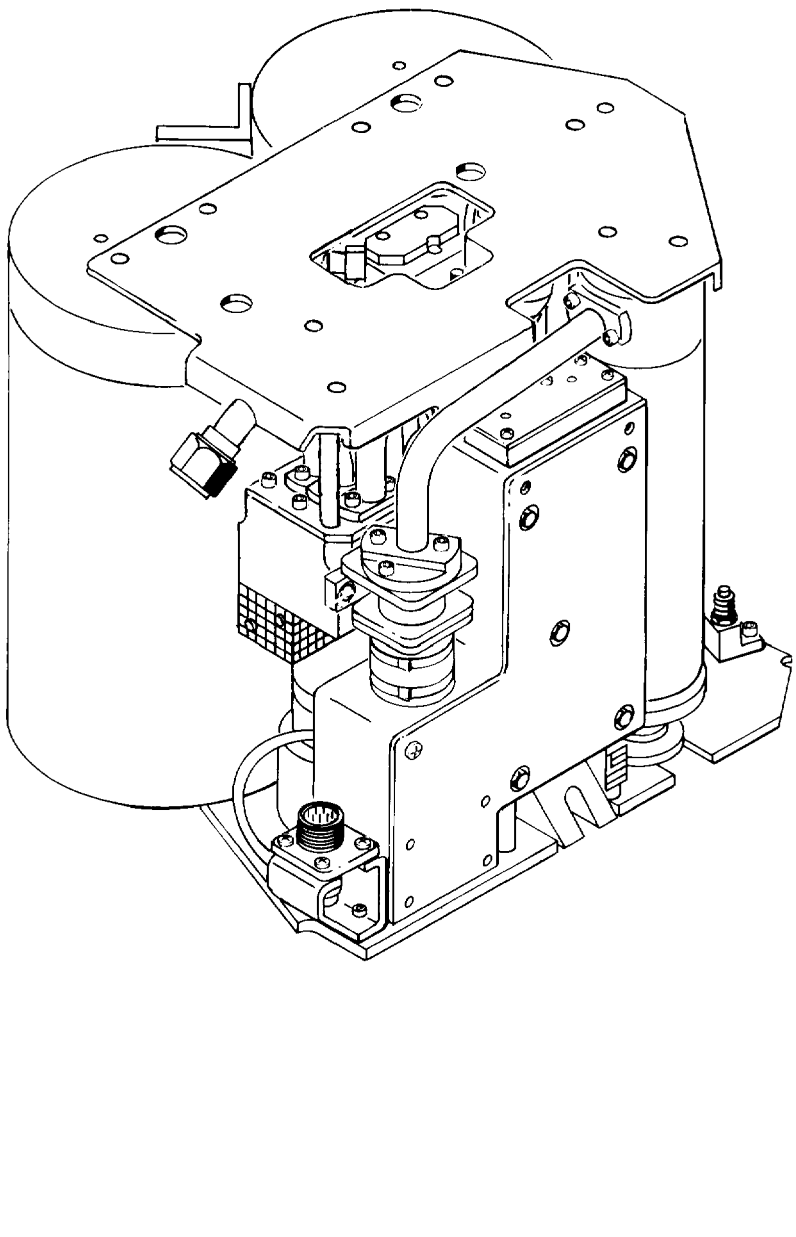
4-4. The OEAS oxygen concentrator consists of an electronics box, heater assembly, filter tube assembly, pressure reducer, pressure reducer, rotary control valve, two molecular sieve beds, and a plenum assembly.

4-5. FUNCTION.

4-6. The OEAS oxygen concentrator incorporates an electronics box (1) (figure 4-2) that operates the heater assembly (3) and rotary control valve (6). Aircraft bleed air passes into the inlet (2) of the heater assembly (3) where it is warmed, then flows through the 0.6 micron filter (4) to the pressure reducer (5). The pressure reducer (5) reduces bleed air inlet pressure to 30 to 37 psig. Bleed air then flows from the pressure reducer (5) to the rotary control valve (6). The rotary control valve opens a path for the bleed air to one of the two molecular sieve beds (7) and closes that bed's nitrogen exhaust port. At the same time, the other molecular sieve bed will be closed to inlet bleed air and open to nitrogen exhaust (8). Inlet bleed air flows from the rotary control valve (6) into the opened molecular sieve bed (7). Bleed air, once in the sieve bed, passes through the sieve bed zeolite filtering agent which absorbs the nitrogen and allows the oxygen enriched air to pass through the sieve bed to the check valve assembly (10). At the check valve assembly the oxygen enriched air will take two paths of flow. One path of flow will be through the check valve assembly (10) into plenum assembly (11) and out of the plenum assembly (11) to the aircraft oxygen system plumbing (12). The second path of flow will be through the purge orifice (9) to the sieve bed (7) that was closed to inlet bleed air. This flow of oxygen enriched air will purge the unused sieve bed (7) and ready it for use. When the rotary control valve (6) cycles, it will close the previously used sieve bed to inlet bleed air and reference the purged sieve bed to inlet bleed air.

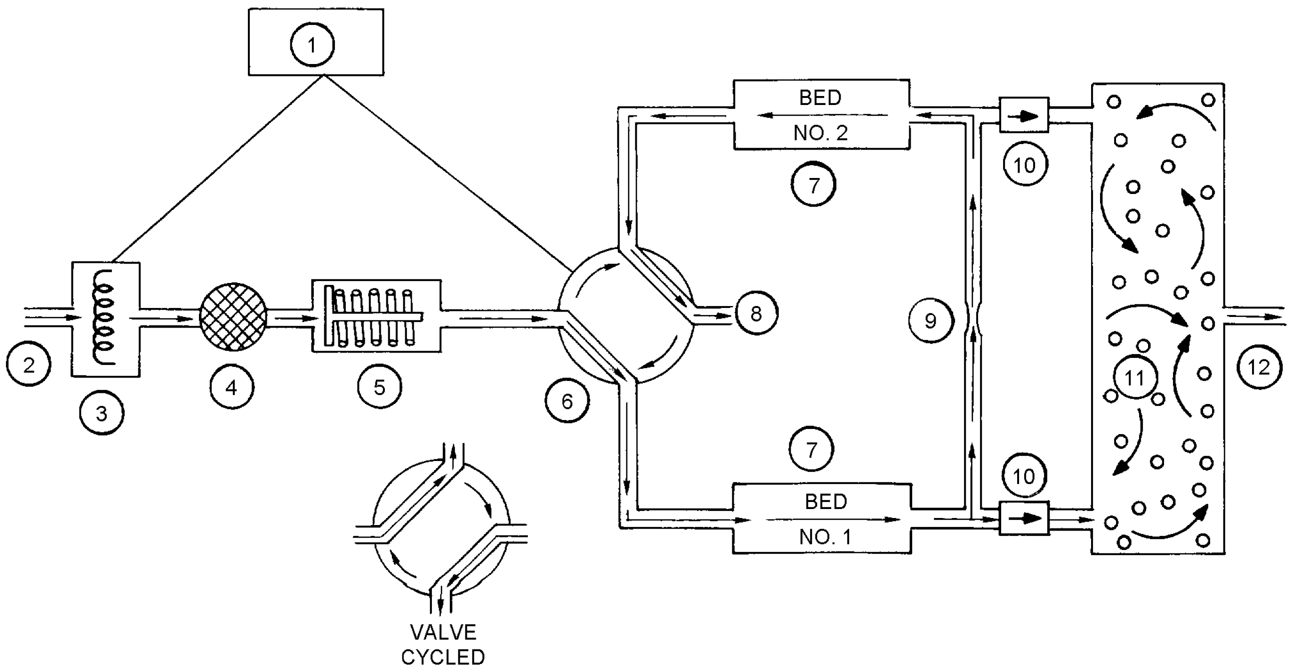
4-7. The heater assembly (3) consists of two heaters that are controlled by a thermistor probe in the air heater. Both or neither element may be activated depending on inlet air temperature.

4-8. The pressure reducer assembly (5) incorporates a relief valve which is set to relieve at 78.5 psig to prevent system overpressurization.



004001

Figure 4-1. OEAS Oxygen Concentrator, P/N 3261009-0105



1. ELECTRONICS BOX
2. BLEED AIR INLET
3. AIR HEATER
4. FILTER
5. PRESSURE REDUCER
6. ROTARY CONTROL VALVE
7. MOLECULAR SIEVE BED
8. EXHAUST
9. ORIFICE
10. CHECK VALVE
11. PLENUM
12. OUTPUT

004002

Figure 4-2. OEAS Oxygen Concentrator Schematic

Table 4-1. Leading Particulars

Type GGU-7/A	8 to 25 psig NORMAL, 250 psig (Max)
Mounting	Aircraft fuselage mounted
Voltage	28 Vdc, 22 amperes (max)
Heater	2 units
Filter	0.6 Micron
Inlet Pressure Range	8 to 25 psig nominal, 250 psig maximum
Pressure Reducer	30 to 37 psig
Relief Valve	78.5 psig relief setting
Rotary Valve	Two position
Sieve Beds	Two unit, molecular type
Plenum	Oxygen enriched air storage
Electronic Box	Power supply for heater and rotary valve
Operating Altitude Range	Sea level to 50,000 feet
Operating Temperature Range	-65°F to +160°F
Overall Dimensions:	
Length	12 1/2 inches
Width	12 1/2 inches
Height	10 1/4 inches
Weight	42.0 lbs (max)

4-9. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

4-10. Section 4-5, Illustrated Parts Breakdown, contains information on the OEAS oxygen concentrator, sub-assemblies and component parts. Figure and index numbers, reference numbers, description, units per assembly, usable on codes, and source, maintenance, and recoverability (SM&R) data are provided with the breakdown.

Section 4-2. Modifications

4-11. GENERAL.

4-12. The OEAS Oxygen Concentrator, Type GGU-7/A should be updated by comparing the configuration of the concentrator with the directives listed in table 4-1A.

Section 4-3. Performance Test Sheet Preparation

4-13. GENERAL.

4-14. A Performance Test Sheet shall be prepared as shown in figure 4-3 and shall be used to record test results. The Performance Test Sheet shown is a sample, but may be reproduced for local use.

Table 4-1A. OEAS Oxygen Concentrator, Type GGU-7/A Directives

Description of Modification	Application	Modification Code
Modification of the Vent Tube Assembly	GGU-7/A	676

Section 4-4. Maintenance

4-15. GENERAL.

4-16. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembling, cleaning, repairing, assembling and adjusting the OEAS oxygen concentrator.

4-17. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and in the sequence in which they normally occur.

NOTE

Upon completion of any maintenance action (e.g. inspection, repair, adjustment, modification, etc.) make necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

4-18. SERVICE LIFE.

NOTE

When replacing filter tube element during scheduled maintenance, the following new parts may have to be installed: water trap (P/N 1653300-1), seal (P/N 1646811-3), element seal nut (P/N 1631082-1), and thread adapter (P/N 1631076-1).

4-19. The filter tube element (figure 4-18) shall be replaced every 500 flight hours during Bench Test. The shroud assembly may also be replaced at this time, if necessary. Refer to Disassembly (paragraph 4-64) and Assembly (paragraph 4-81) for instructions.

4-20. INSPECTIONS.

4-21. OEAS oxygen concentrators which do not pass inspection and cannot be adjusted in the aircraft shall be removed and replaced with a Ready-For-Installation (RFI) OEAS oxygen concentrator. The replaced OEAS oxygen concentrator shall be forwarded to AIMD/MALS for Bench Test and Repair.

4-22. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. The Turnaround, Preflight, Postflight, or Transfer Inspections are performed in conjunction with the aircraft inspection requirements for the aircraft in which the OEAS oxygen concentrator is installed.

4-23. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance, Special, or Daily Inspections shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the OEAS oxygen concentrator is installed using applicable aircraft technical publications and maintenance requirement cards.

4-24. CALENDAR/PHASED/SDLM INSPECTIONS. The Calendar, Phased, or SDLM Inspections require removal of the OEAS oxygen concentrator from the aircraft. See applicable planned maintenance system (PMS) publications for specified intervals. In no case shall the interval exceed 500 flight hours. Upon removal from the aircraft, the concentrator shall be forwarded to AIMD/MALS for Inspection and Bench Test.

4-25. VISUAL INSPECTION. To perform a Visual Inspection of the OEAS oxygen concentrator, proceed as follows:

1. Inspect the OEAS oxygen concentrator for dents, corrosion, dirt, contamination, and other obvious damage.

2. Inspect electrical connections and wiring for good connection, breaks in wires, corrosion, and bent or missing pins.

3. Inspect all welded points for security of attachment and breaks in welding. Inspect rotary valve sieve tubes and vent tube for security of attachment and good condition.

4. Inspect shroud assembly for cuts, tears, and good condition.

5. Inspect insulation blanket for cuts, tears, and good conditions.

6. Inspect heater assembly insulation cover for burns, charring, and good condition.

7. Inspect all external screws, nuts, and fittings for good conditions and security of attachment.

8. Inspect name plate for legibility, security of attachment, and good condition.

CONCENTRATOR PERFORMANCE TEST SHEET
OXYGEN CONCENTRATOR
P/N 3261009-0105

DATE ________________ CONCENTRATOR SERIAL NO. ______________________________

TEST STAND SERIAL NO. ______________________________

TEST STAND OPERATOR: ______________________________

CDA ______________________________

1. DISPLAY LAMP TEST:
   INITIAL READING OF MOTOR SOLENOID (M1) ____________________
   INITIAL READING OF HEATERS NO. 1 AND 2 (M2 AND M3) ____________________
   HEATER NO. 1 (M2) __________ HEATER NO. 2 (M3) ____________________
   CHECK IF DS2 AND/OR DS3 ILLUMINATE
   DS2 ____________________ DS3 ____________________

2. MOTOR HEATER SOLENOID CURRENT TEST
   READINGS FOR MOTOR SOLENOID (M1), HEATER NO. 1 (M2), AND HEATER NO. 2 (M3)
   MOTOR SOLENOID (M1) ________ (1.5 - 2.5 AMPS)
   HEATER NO. 1 (M2) __________ (0 OR 7 - 10 AMPS)
   HEATER NO. 2 (M3) __________ (0 OR 7 - 10 AMPS)

3. MOTER VALVE RPM TEST (11 - 13 CYCLES)
   NUMBER OF CYCLES DURING ONE MINUTE ____________________

4. PRESSURE REDUCER TEST (30 - 37 PSIG)
   READ AIR-OXY PRESSURE GAGE (G1) ____________________

5. INTERNAL LEAK TEST
   INITIAL READING AIR-OXY PRESSURE GAGE (G1) ____________________
   READING AFTER 1 MINUTE (G1)
   (MAXIMUM DECREASE AFTER 1 MINUTE IS 3 PSIG)
   READING AFTER 5 MINUTE (G1) ____________________
   (MAXIMUM DECREASE AFTER 5 MINUTE IS 15 PSIG)

6. OXYGEN FLOW/FILTER FLOW TEST
   FILTER FLOW TEST YES ________

   SET AIR-OXY PRESSURE GAGE (G1) TO 8 PSIG

V2	G1 READING	G1 ALLOWED (PSIG)	M4 READING	M4 ALLOWED (%)
HIGH		N/A		22
MEDIUM		3.0 - 8.0		25
LOW		4.0 - 8.0		31

   SET AIR-OXY PRESSURE GAGE (G1) TO 25 PSIG

V2	G1 READING	G1 ALLOWED (PSIG)	M4 READING	M4 ALLOWED (%)
HIGH		16.0 - 25.0		41
MEDIUM		18.0 - 25.0		47
LOW		20.0 - 25.0		85

Figure 4-3. Performance Test Sheet (For TTU-452A/E Test Set)

CONCENTRATOR PERFORMANCE TEST SHEET
OXYGEN CONCENTRATOR
P/N 3261009-0105

DATE ________________ CONCENTRATOR SERIAL NO. ______________________________

TEST STAND SERIAL NO. ______________________________

TEST STAND OPERATOR: ______________________________

CDI ______________________________

1. DISPLAY LAMP TEST:
   INITIAL READING OF MOTOR SOLENOID (M1) ____________________
   CHECK IF DS3, DS4, DS5 AND/OR DS6 ILLUMINATE
   DS3 ____________ DS4 ____________ DS5 ____________ DS6 ____________

2. MOTOR HEATER SOLENOID CURRENT TEST
   READINGS FOR MOTOR SOLENOID (M1)
   ____________________ (1.8 - 2.5 AMPS)

3. MOTOR VALVE RPM TEST (11 - 13 CYCLES)
   NUMBER OF CYCLES DURING ONE MINUTE ____________________

4. PRESSURE REDUCER TEST (30 - 37 PSIG)
   READ AIR-OXY PRESSURE GAGE (G1) ____________________

5. INTERNAL LEAK TEST
   INITIAL READING AIR-OXY PRESSURE GAGE (G1) ____________________
   READING AFTER 1 MINUTE (G1) ____________________
   (MAXIMUM DECREASE AFTER 1 MINUTE IS 3 PSIG)
   READING AFTER 5 MINUTE (G1) ____________________
   (MAXIMUM DECREASE AFTER 5 MINUTE IS 15 PSIG)

6. OXYGEN FLOW AND FILTER BLEED FLOW TEST
   FILTER FLOW TEST YES ________

   SET AIR-OXY PRESSURE GAGE (G1) TO 8 PSIG

V2	G1 READING	G1 ALLOWED (PSIG)	M3 READING	M3 ALLOWED (%)
HIGH		N/A		22
MEDIUM		2.4 - 8.0		25
LOW		3.0 - 8.0		31

SET AIR-OXY PRESSURE GAGE (G1) TO 25 PSIG

V2	G1 READING	G1 ALLOWED (PSIG)	M3 READING	M3 ALLOWED (%)
HIGH		12.4 - 25.0		41
MEDIUM		14.4 - 25.0		47
LOW		17.4 - 25.0		85

Figure 4-4. Performance Test Sheet (For TTU-518A/E Test Set)

4-26. BENCH TEST.

WARNING

When working with oxygen, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

NOTE

When performing Bench Test, use Performance Test Sheet (figure 4-3 or 4-4) for recording readings and indications as they apply. Read the entire step before beginning to familiarize yourself with what needs to be recorded for step.

Tests are arranged so they proceed from one test to the next with a minimum of change of connections and valve positioning. Troubleshooting tables are provided in paragraph 4-62.

OEAS oxygen concentrators failing the Bench Test shall be repaired. The aviation life support systems division shall replace all defective component parts and make necessary adjustments to the OEAS oxygen concentrator.

4-27. Bench Test shall be performed on the OEAS oxygen concentrator prior to being placed in service and every 500 flight hours thereafter. The OEAS oxygen concentrator shall also be subjected to Bench Test if malfunction is suspected, and after repair or replacement of malfunctioning or damaged parts.

4-28. The Bench Test shall be performed using either OEAS Oxygen Concentrator Test Set Model TTU-452A/E (P/N 1779AS100-2) or Model TTU-518A/E (P/N 1779AS500-2) with or without OBOGS Adapter Assembly P/N 3248AS200-1. Refer to appropriate ground support equipment manual for identification of test set controls and indicators referred to in Bench Test.

4-29. Due to the complexity of the model TTU-452A/E and model TTU-518A/E test sets, it is essential that the operator become thoroughly familiar with the test set being used prior to performing the Bench Test. Refer to appropriate ground support equipment manual.

4-30. Unless otherwise specified in a specific test, the pressure applied and valve positioning shall remain unchanged.

4-31. BENCH TEST USING MODEL TTU-452A/E TEST SET ONLY.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Concentrator	3306265-1
1	Cable Assembly, Power Supply	3306284-1
1	Concentrator Test Set, Model TTU-452A/E	1779AS100-2 (CAGE 30003)
1	Filter Assembly, Inlet	1779AS581-1
1	Muffler Assembly	1779AS578-1
1	Hose Assembly, Inlet	3306273-1
1	Hose Assembly, Outlet	3306274-1
1	Regulator, Pressure	283028-0001 (CAGE 99657) NIIN 01-101-8827 or equivalent

4-32. Display Lamp Test. To perform the Display Lamp Test, proceed as follows:

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings, tools, and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc.) and any other combustible materials. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

CAUTION

Do not lift or carry the OEAS oxygen concentrator by the exhaust vent tube assembly of the rotary valve assembly. Damage to the OEAS oxygen concentrator will occur.

1. Ensure circuit breaker INSTM on (CB2) is reset (push in to reset).

2. Ensure 28 VDC ON circuit breaker (CB1) is OFF.

3. Ensure CONC ON/OFF switch (S1) is OFF.

4. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

5. Turn FLOW SELECT valve (V2) to LOW position.

6. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are closed.

7. Ensure AIR PRESSURE CONTROL (RG1) and FLOW PRESSURE CONTROL (RG2) are backed out counterclockwise until spring tension is released.

8. Ensure test panel vent (PV-1) located adjacent to flow pressure gage (G2) is not blocked or covered.

9. Remove all hoses, adapters, muffler, and filters from test set lid assembly.

NOTE

Index numbers refer to figure 4-5 unless otherwise stated.

10. Remove cap from concentrator test set AIR TO CONC fitting (J4) and connect inlet hose (P/N 3306273-1) to inlet fitting (1) of concentrator and AIR TO CONC fitting (J4) of test set.

11. Remove cap from concentrator test set OXY FROM CONC fitting (J3) and connect outlet hose (P/N 3306274-1) to outlet fitting (2) of concentrator and OXY FROM CONC fitting (J3) of test set.

CAUTION

Do not restrict exhaust flow from concentrator by any other means than the muffler assembly.

12. Connect muffler assembly to exhaust vent tube (3) of concentrator.

13. Uncap OXY EXHAUST port (J5) of test set.

14. Remove cap from concentrator test set filter port fitting (J1) and connect inlet filter assembly to filter port fitting (J1).

15. Connect a 90 to 120 psig regulated clean, dry air source capable of supplying 26 SCFM to the inlet filter assembly.

CAUTION

Do not connect 28 Vdc return and case ground together. Allow 28 Vdc to float.

16. Remove cap from concentrator test set 28 Vdc connector (J10) and connect power supply cable (P/N 3306284-1) to test set 28 Vdc connector (J10) and 28 Vdc power supply. The connector on the power supply end of the cable is an MS3106A16-11. Pin B is +28 Vdc (Pos) and Pin A is return (Neg). The connector shell is case ground.

17. Turn on power supply.

18. Turn 28 VDC ON circuit breaker (CB1) to ON (DS1 and DS3 lamps will illuminate).

19. Turn CONC ON switch (S1) to ON (DS2 lamp will illuminate, then turn CONC ON switch (S1) to OFF.

20. Remove cap from concentrator test set CONC POWER connector (J11) and connect concentrator cable assembly (P/N 3306265-1) test set CONC POWER connector (J11) and concentrator electrical connector (4).

21. Push display TEST (S2), CONC ON lamp (DS2) and RG4 HEATER lamp (DS3) shall illuminate. Release display TEST (S2).

22. Turn on shop air supply, INLET pressure gage (G3) should indicate 90 to 120 psig.

CAUTION

CONC ON switch (S1) power and RG1 AIR PRESSURE should be applied simultaneously or damage to concentrator rotary valve and air heater assembly could occur.

NOTE

Heaters will not be required if the air temperature is above 110°F. After concentrator warm-up has stabilized, either meter M2 or M3 should read zero. The other meter will cycle on and off. (It is possible for either heater to cycle during normal use.)

23. Set CONC ON switch (S1) to ON and record on a Performance Test Sheet the initial reading indicated on MOTOR SOLENOID indicator (M1) (initial reading 1.5

to 2.5 amps which decrease to a continuous reading of 1.5 to 2.5 amps). Also record the initial readings indicated on HEATER NO. 1 (M2) and HEATER NO. 2 (M3) indicators (readings of 7 to 10 amps should be indicated immediately when CONC ON switch (S1) is set to ON).

24. Record on Performance Test Sheet whether lamps (DS2) and (DS3) illuminate.

25. Adjust AIR PRESSURE CONTROL valve (RGI) clockwise until AIR-OXY PRESSURE gage (G1) reads 25 psig.

26. Open CONC FLOW valve (V4).

CAUTION

To prevent damage to FLOW PRESSURE gage (G2) during step 27, slowly open FLOW PRESSURE CONTROL valve (RG2) while observing movement of gage (G2) indicator.

27. Slowly adjust FLOW PRESSURE CONTROL valve (RG2) clockwise until FLOW PRESSURE gage (G2) indicates 30 inH_2O.

28. Leave all connections and valves unchanged and proceed to Motor Heater Solenoid Current Test (paragraph 4-33).

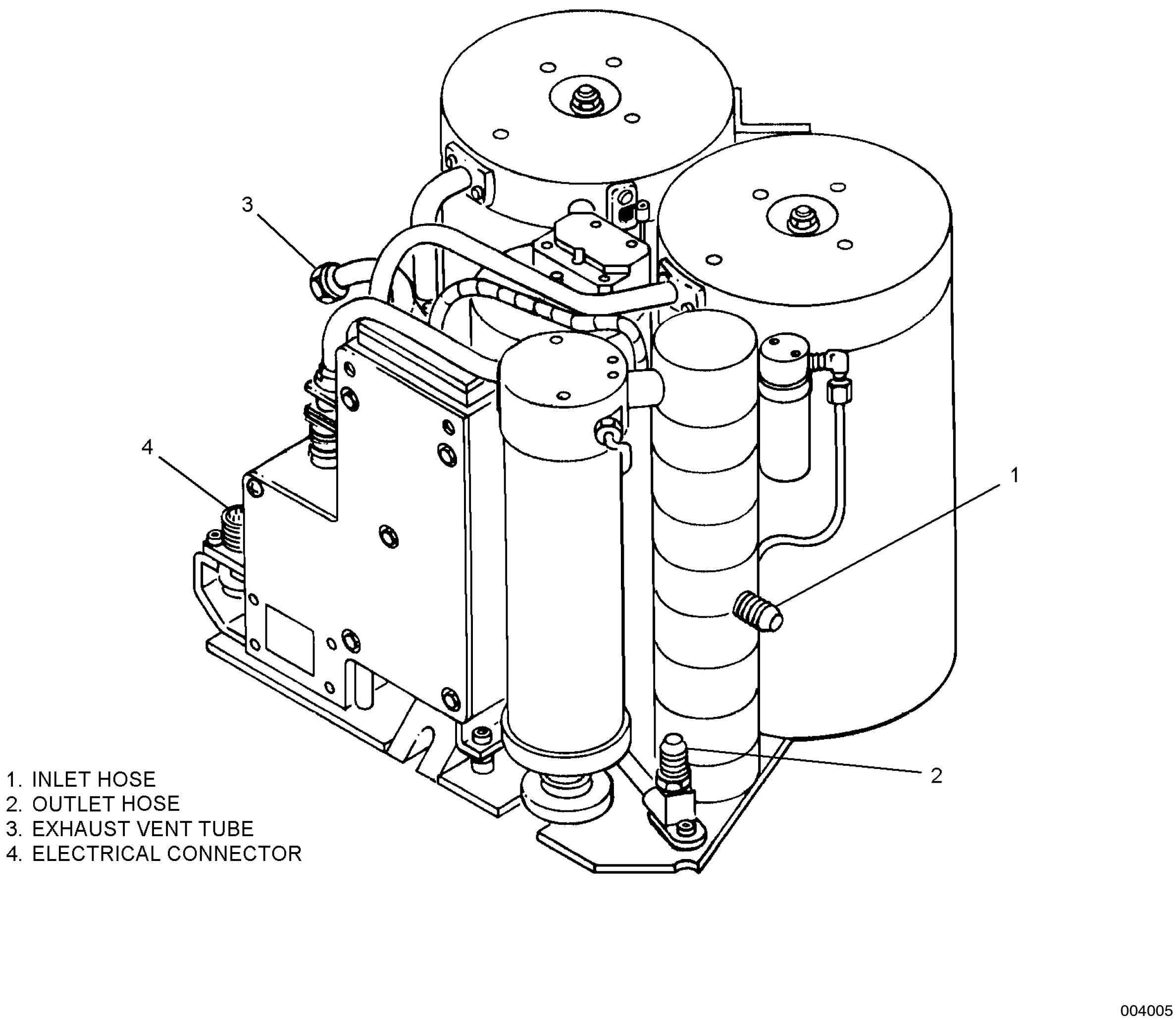


Figure 4-5. OEAS Oxygen Concentrator Test Connections

4-33. Motor Heater Solenoid Current Test. To perform the Motor Heater Solenoid Current Test, proceed as follows:

NOTE

During step 1, meters M1, M2, and M3 should indicate as follows:

MOTOR SOLENOID (M1), 1.5 to 2.5 amps
HEATER NO. 1 (M2), 7 to 10 amps or momentary cycling
HEATER NO. 2 (M3), 7 to 10 amps or momentary cycling

1. Turn CONC ON switch (S1) to OFF then to ON, record reading from meters (M1), (M2), and (M3) on Performance Test Sheet.

2. If readings are within tolerance, proceed to Motor Valve RPM Test (paragraph 4-34). If readings are not within tolerance, refer to Troubleshooting (paragraph 4-62).

4-34. Motor Valve RPM Test. To perform the Motor Valve RPM Test, proceed as follows:

NOTE

When performing steps 1 and 2, the concentrator should cycle 11 to 13 times in one minute. The cycles will be indicated by a sudden rapid drop in pressure displayed on AIR-OXY PRESSURE gage (G1), followed by a return to normal pressure. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to the concentrator exhaust port.

1. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position.

2. Count the number of pressure drops that occur during one minute, number of pressure drops shall be 11 to 13. Record number of pressure drops on Performance Test Sheet.

3. If number of pressure drops are within tolerance, proceed to Pressure Reducer Test (paragraph 4-35). If number of pressure drops are not within tolerance, refer to Troubleshooting (paragraph 4-62).

4-35. Pressure Reducer Test. To perform the Pressure Reducer Test, proceed as follows:

CAUTION

Ensure OXY from CONC valve (V4) is open prior to setting 30 inH_2O with FLOW PRESSURE CONTROL valve (RG2).

1. Slowly adjust FLOW PRESSURE CONTROL valve (RG2) until FLOW PRESSURE gage (G2) indicates 30 inH_2O.

2. Turn PRESSURE SELECT valve (V1) to the AIR TO CONC position.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until AIR-OXY PRESSURE gage (G1) indicates 60 ± 1 psig.

4. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position. AIR-OXY PRESSURE gage (G1) should indicate 30 to 37 psig during high pressure swing, record reading from AIR-OXY PRESSURE gage (G1) on Performance Test Sheet.

5. If reading from AIR-OXY PRESSURE gage (G1) is within tolerance, proceed to Internal Leakage Test (paragraph 4-36). If reading from AIR-OXY PRESSURE gage (G1) is not within tolerance, refer to Troubleshooting (paragraph 4-62).

4-36. Internal Leakage Test. To perform the Internal Leakage Test, proceed as follows:

1. Close OXY ANALYZER valve (V3) and CONC FLOW valve (V4).

2. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until 60 psig is indicated on AIR-OXY PRESSURE gage (G1).

4. Set CONC ON switch (S1) to OFF position.

5. Adjust AIR PRESSURE CONTROL valve (RG1) until 5 psig is indicated on AIR-OXY PRESSURE gage (G1).

6. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and record initial reading from AIR-OXY PRESSURE gage (G1) on Performance Test Sheet.

NOTE

After taking initial reading in step 7, note time. After waiting one minute, note pressure on AIR-OXY PRESSURE gage (G1). Pressure drop shall not exceed 3 psig. If pressure drop exceeds 3 psig, continue the test for 5 minutes. If the pressure drop does not exceed 15 psig, the test is satisfactory.

7. Observe AIR-OXY PRESSURE gage (G1) for one minute; pressure drop shall not exceed 3 psig. Record reading on Performance Test Sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop shall not exceed 15 psig. Record reading on Performance Test Sheet.

8. Set CONC FLOW valve (V4) to OPEN position.

9. Set CONC ON switch (S1) to ON position.

10. If final reading for internal leakage test is within tolerance, proceed to Oxygen Flow and Air Filter Bleed Flow Test (paragraph 4-38). If final reading for Internal Leakage Test is not within tolerance, refer to Troubleshooting (paragraph 4-62).

NOTE

Monitor Test (paragraph 4-37) is performed daily in accordance with the applicable support equipment technical publication. Therefore, paragraph 4-37 need only be performed if the concentrator being tested fails the Oxygen Flow Test.

4-37. Monitor Test. In order to prevent unnecessary replacement of concentrator sieve beds, the Monitor Test is performed only if the concentrator fails the Oxygen Flow and Air Filter Bleed Flow Test (paragraph 4-38). To perform the Monitor Test, refer to the appropriate support equipment technical manual.

4-38. Oxygen Flow And Air Filter Bleed Flow Test. To perform the Oxygen Flow and Air Filter Bleed Flow Test, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

Ensure air filter assembly has been modified in accordance with paragraph 4-96.

1. Adjust air pressure control valve (RG1) until 25 psig is indicated on AIR-OXY PRESSURE gage (G1).

2. Record on Performance Test Sheet if air is bleeding through inlet filter assembly bleed orifice.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until 0 psig is indicated on AIR-OXY PRESSURE gage (G1).

4. Set CONC POWER switch (S1) to ON position.

5. Set OXY ANALYZER valve (V3) to OPEN position.

6. Set CONC FLOW valve (V4) to OPEN position.

7. Adjust AIR PRESSURE CONTROL valve (RG1) until 8 psig is indicated on AIR-OXY PRESSURE gage (G1).

8. Turn FLOW SELECT valve (V2) to HIGH position.

9. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inH_2O is indicated on FLOW PRESSURE gage (G2).

10. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position, and adjust air pressure control valve (RG1) to 8 psi as indicated on AIR-OXY PRESSURE gage (G1).

11. Maintain 30 inH_2O as indicated on FLOW PRESSURE gage (G2). Allow reading on % OXYGEN (M4) to stabilize.

NOTE

When taking reading from AIR-OXY PRESSURE gage (G1), there will be a pressure swing; record both the low and high pressure indications on Performance Test Sheet.

12. Record readings from AIR-OXY PRESSURE gage (G1) and % OXYGEN meter (M4) on Performance Test Sheet. Readings shall meet the requirement listed on Performance Test Sheet.

13. Turn FLOW SELECT valve (V2) to MED position and repeat steps 9 through 12.

14. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 9 through 12.

15. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

16. Adjust AIR PRESSURE CONTROL valve (RG1) until 25 psig is indicated on AIR-OXY PRESSURE gage (G1).

17. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and repeat steps 8 through 14, with the following exception, pressure in step 10 shall be adjusted to 25 psig.

18. If readings are not within tolerance, refer to Troubleshooting (paragraph 4-62). If readings are within tolerance, secure from testing as follows:

19. Turn FLOW PRESSURE CONTROL valve (RG2) counterclockwise until spring tension is released.

20. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

21. Set CONC ON switch (S1) and 28 VDC circuit breaker (CB1) to OFF position.

22. Turn off 28 Vdc power supply.

23. Turn AIR PRESSURE CONTROL valve (RG1) counterclockwise until spring tension is released.

24. Set OXY ANALYZER valve (V3) and CONC FLOW valve (V4) to CLOSED position.

25. Shut off shop air supply.

26. Disconnect all hoses and cable assemblies, muffler, and inlet filter from test set and concentrator and install in lid of test set.

27. Reinstall all protective caps on test set and concentrator.

4-39. BENCH TEST USING MODEL TTU-452A/E TEST SET WITH OBOGS ADAPTER ASSEMBLY P/N 3248AS200-1.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Concentrator	3306265-1
1	Cable Assembly, Power Supply	3306284-1
1	Concentrator Test Set, Model TTU-452A/E	1779AS100-2 (CAGE 30003)

Support Equipment Required (Cont)

Quantity	Description	Reference Number
1	Filter Assembly, Inlet	1779AS581-1
1	Muffler Assembly	1779AS578-1
1	Hose Assembly, Inlet	3306273-1
1	Hose Assembly, Outlet	3306274-1
1	OBOGS Adapter Assembly	P/N 3248AS200-1
1	Regulator, Pressure	283028-0001 (CAGE 99657) NIIN 01-101-8827 or equivalent

4-40. Test Set Setup And Display Lamp Test. To set up the test set and check out its display lamps utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings, tools and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc) and any other combustible materials. Fire or explosion may result when even slight traces of combustible material are exposed to oxygen under pressure.

CAUTION

Do not lift or carry the oxygen concentrator by the exhaust vent metallic tube assembly. Damage to the oxygen concentrator will occur.

NOTE

Paragraphs 4-40 through 4-45 contain the procedural steps for testing of the GGU-7/A oxygen concentrator utilizing Model Test Set TTU-452A/E with the OBOGS ADAPTER Assembly part number (3248AS200-1) as a work around test fixture only.

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Ensure test set lid is removed and circuit breaker INSTM ON (CB2) is in the RESET position (pushed in).

2. Open OBOGS ADAPTER assembly box (7).

3. Turn on OBOGS Adapter Assembly valve (3).

4. Ensure circuit breakers 28 V DC ON (CB1) and CONC ON switch (S1) are OFF.

5. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position.

6. Turn FLOW SELECT valve (V2) to LOW position.

NOTE

OXY ANALYZER (V3) and CONC FLOW (V4) are toggle valves. They are closed when the black handle is parallel to the panel assembly. They are open when the black handle is perpendicular to the panel assembly.

7. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are in the closed position.

NOTE

AIR PRESSURE CONTROL valve (RG1) will not be used for testing during this procedure.

8. Ensure adjusting knob of AIR PRESSURE CONTROL (RG1) is turned counterclockwise four turns or until spring tension is released.

9. Ensure adjusting knob of FLOW PRESSURE CONTROL (RG2) is turned counterclockwise four turns or until spring tension is released.

10. Ensure test set panel vent located next to FLEW PRESSURE gage (G2) is not blocked or covered.

11. Remove all hoses, cables, adapters, filters, and muffler from lid of concentrator test set.

12. Remove cap assembly from concentrator OXY FROM CONC (J3).

13. Cap AIR TO CONC (J4) and FILTER PORT (J1).

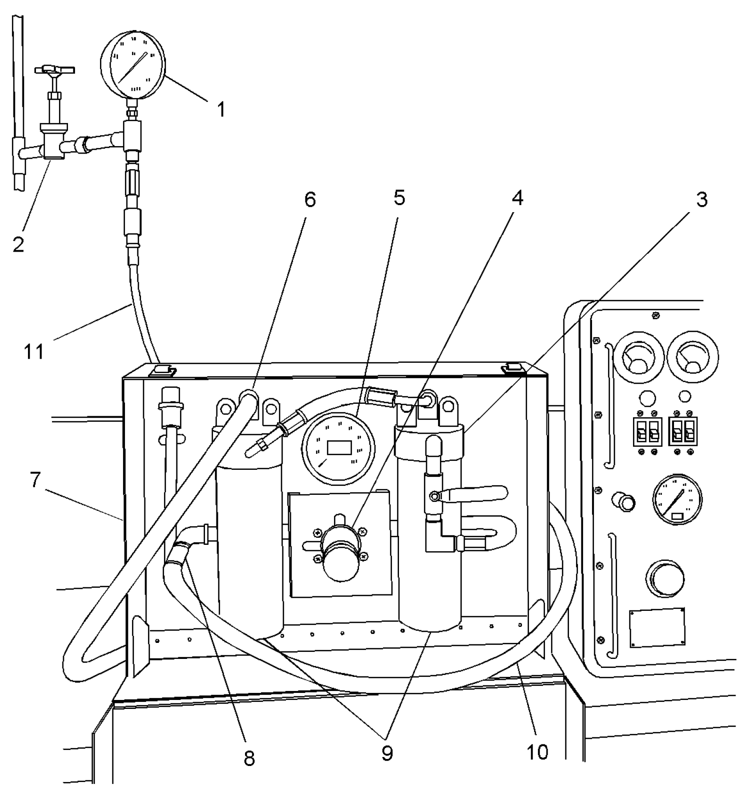


Figure 4-6. OBOGS Adapter Assembly

14. Remove protective shipping caps and connect one end of concentrator outlet hose assembly (P/N 3306274-1) to OXY FROM CONC fitting (J3) of test set. Connect other end of outlet hose to concentrator outlet fitting.

15. Remove protective shipping plugs and connect one end of OBOGS Adapter Assembly Outlet Hose Assembly (10) to OBOGS Adapter Assembly Outlet Port (8). Connect other end of OBOGS Adapter Assembly Outlet Hose (10) to concentrator inlet port.

CAUTION

Do not restrict exhaust flow from concentrator by any means other than the muffler assembly.

16. Connect muffler assembly (P/N 3306270-1 or 3306268-1) to concentrator vent tube.

17. Remove protective shipping cap from OXY EXHAUST port (JS) of test set.

18. Remove protective shipping caps from 28 V DC power supply cable assembly (P/N 3306284-1).

CAUTION

Do not connect 28 V DC return and case ground together. Allow 28 V DC to float.

NOTE

Power supply end of cable is (P/N MS3106A16-11P) (Pin B is 28 V DC and pin A is return negative). The connector shell is case ground.

19. Remove cap from test set 28 V DC connector (J10). Connect 28V DC cable (P/N 3306284-1) to 28 V DC connector (J10) and to 28 V DC power supply connector.

20. Turn on power supply.

WARNING

Hazardous voltages may be present on case of the test set if power plug and source are not connected to safety ground (green wire).

21. Set 28 V DC ON circuit breaker (CB1) to ON. Lamp (DS1), RG-4 HEATER lamp (DS3), and meter (M4) will illuminate.

22. Remove cap assembly from 28V CONC POWER (J11) on test set.

23. Remove protective shipping covers from concentrator cable assembly (P/N 3306265-1). Connect one end of cable to 28 V DC CONC POWER (J11) and connect the other end to the concentrator electrical connector.

NOTE

% OXYGEN meter (M4) will initially read 0.5% and should stabilize at approximately 20% or higher within 5 minutes.

24. Push Test Display button (S2). Lamp (DS2) and RG-4 HEATER lamp (DS3) shall illuminate and extinguish when (S2) is released.

25. Ensure that the adjusting knob of OBOGS Adapter Assembly Regulator (4) is turned counterclockwise four turns or until spring tension is released.

NOTE

AIMD intermediate level maintenance shops will require an ON/OFF valve (2) and a 0 to 160 psig gage (1) or suitable substitutes installed on shop air supply source prior to the OBOGS Adapter Assembly Inlet. (Figure 4-6) shall be used for orientation of assembly.

26. Connect OBOGS Adapter Assembly Hose (11) to OBOGS Adapter Assembly INLET Port (6). Connect the other end of OBOGS Adapter Assembly Hose (11) to shop air source.

27. Turn on shop air supply. Pressure will be indicated on Shop Air Supply gage (1). At no time during operation shall Shop Air Supply gage (1) fall below 75 psig during the high-pressure swing.

28. Open OBOGS Adapter Assembly Bleed Ports (9) 1/4 to 1/2 turn until a slight bleed is present.

NOTE

Heaters will not be required if the air temperature is above 110°F. After concentrator warm-up has stabilized, either meter M2 or M3 should read zero. The other meter will cycle on and off. (It is possible for either heater to cycle during normal use.)

29. Set CONC ON switch (S1) to ON and record on a Performance Test Sheet the initial reading indicated on MOTOR SOLENOID indicator (M1) (initial reading 1.5 to 2.5 amps). Also record the initial readings indicated on HEATER NO. 1 (M2) and HEATER NO. 2 (M3) indicators (readings of 7 to 10 amps should be indicated immediately when CONC ON switch is set to on).

30. Place CONC FLOW valve (V4) to the OPEN position.

31. Adjust OBOGS Adapter Assembly Regulator knob (4) until 25 psig is indicated on FLOW PRESSURE gage (G1) during high-pressure swing.

32. If readings are within tolerance, proceed to motor heater solenoid current test paragraph 4-41. If readings are not within tolerance, refer to paragraph 4-62, Troubleshooting.

4-41. Motor Heater Solenoid Current Test. To perform the motor heater solenoid test utilizing the OBOGS Adapter Assembly PIN 3248AS200-1, proceed as follows:

NOTE

Meters M1, M2, and M3 should indicate as follows:
MOTOR SOLENOID (M1), 1.5 to 2.5 amps
HEATER NO. 1 (M2), 7 to 10 amps or monetary cycling
HEATER NO. 2 (M3), 7 to 10 amps or monetary cycling

1. Turn CONC ON switch (S1) to OFF then to ON, record reading from meters (M1), (M2), and (M3) on performance test sheet.

2. If readings are within tolerance, proceed to motor valve rpm test paragraph 4-42, If readings are not within tolerance, refer to paragraph 4-62, Troubleshooting.

4-42. Motor Valve RPM Test. To perform the motor valve rpm test utilizing the OBOGS Adapter Assembly PIN 3248AS200-1, proceed as follows:

NOTE

When performing steps 1 and 2, the concentrator should cycle 11 to 13 times in one minute. The cycles will be indicated by a sudden rapid drop in pressure displayed on AIR/OXY PRESSURE gage (G1), followed by a return to normal pressure per revolution. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to concentrator exhaust port.

1. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

2. Count the number of pressure drops that occur during one minute. The number of pressure drops shall be 11 to 13. Record number of pressure drops on performance test sheet.

3. If the numbers of pressure drops are within tolerance, proceed to pressure reducer test paragraph 4-43. If number of pressure drops are not within tolerance, refer to paragraph 4-62, Troubleshooting.

4-43. Pressure Reducer Test. To perform the pressure reducer test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

2. Adjust OBOGS ADAPTER OBOGS Adapter Assembly Regulator knob (4) until OBOGS Adapter Assembly Gage (5) indicates 60 ±1 psig during high-pressure swing. AIR/OXYGEN PRESSURE gage (G1) should indicate 30 to 37 psig during high-pressure swing. Record reading from AIR/OXYGEN PRESSURE gage (G1) on performance test sheet.

3. If reading from AIR/OXYGEN PRESSURE gage (G1) is within tolerance, proceed to internal leakage test, paragraph 4-44. If reading from AIR/OXYGEN PRESSURE gage (G1) is not within tolerance, refer to paragraph 4-62, Troubleshooting.

4-44. Internal Leakage Test. To perform the internal leakage test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Adjust OBOGS Adapter Assembly Regulator knob (4) until OBOGS Adapter Assembly Gage (5) indicates 60 ±1 psig during high-pressure swing.

2. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

3. Close CONC FLOW valve (V4).

4. Adjust OBOGS Adapter Assembly Regulator knob (4) until 10 psig is indicated on OBOGS Adapter Assembly Gage (5).

5. Record initial reading from AIR-OXY Pressure Gage (G 1) on performance test.

NOTE

After taking initial reading in step 7, note time, and wait one minute then note pressure on AIR-OXY PRESSURE gage (G1). Pressure drop shall not exceed 3 psig. If pressure drop exceeds 3 psig, continue the test for 5 minutes pressure drop shall not exceed 15 psig. Record reading on performance test sheet.

6. Observe AIR-OXY PRESSURE gage (G1) for one minute, pressure drop shall not exceed 3 psig. Record reading on performance test sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop shall not exceed 15 psig. Record reading on performance test sheet.

7. Set CONC FLOW valve (V4) to OPEN position.

8. If final reading for internal leakage is within tolerance, proceed to oxygen flow and air filter bleed flow test paragraph 4-45. If final reading for internal leakage test is not within tolerance, refer to paragraph 4-62, Troubleshooting.

4-45. Oxygen Flow Test and Air Filter Bleed Flow Test. To perform the oxygen flow test/filter drain test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

While performing the oxygen flow test, ensure that while the concentrator is operating (CONC ON switch (S1) is On) that the reading on Air Supply gage (1) has a peak reading of 75 psig or higher on the high pressure swing. If the pressure reading falls below 75 psig on the high swing, the air supply, concentrator filter assembly or OBOGS adapter filter system is inadequate and does not meet the specified requirements.

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Adjust OBOGS Adapter Assembly Regulator knob (4) until 50 psig is indicated on OBOGS Adapter Assembly Gage (5).

2. Record on performance test sheet if air is bleeding through inlet filter assembly bleed orifice.

CAUTION

To prevent damage to FLOW PRESSURE gage (G2), slowly open FLOW PRESSURE CONTROL valve (RG2) while observing movement of gage (G2) indicator.

3. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inH_2O indicated on FLOW PRESSURE gage (G2) on the high-pressure swing.

4. Adjust OBOGS Adapter Assembly Regulator knob (4) until 8 psig is indicated on AIR/OXY PRESSURE gage (G1) on the high-pressure swing.

5. Ensure CONC FLOW valve (V4) is in the OPEN position.

6. Set OXY ANALYZER valve (V3) to OPEN position.

7. Turn FLOW SELECT valve (V2) to HIGH position.

8. Adjust OBOGS Adapter Assembly Regulator knob (4) until to 8 psig as indicated on AIR/OXYGEN PRESSURE gage (G1) on the High Pressure Swing.

9. Maintain 30 inches of water at high-pressure swing as indicated on FLOW PRESSURE gage (G2) on the high-pressure swing. Allow reading on % OXYGEN meter (M4) to stabilize approximately 5 minutes.

NOTE

When taking reading from AIR/OXY PRESSURE gage (G1), there will be a pressure swing. Record both the low and high-pressure indications on the performance test sheet.

10. Record readings from on AIR-OXYGEN PRESSURE gage (G1) and reading from % OXYGEN meter (M4) on performance test sheet. Readings shall meet the requirement listed on performance test sheet.

11. Turn FLOW SELECT valve (V2) to MED position and repeat steps 8 through 10.

12. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 8 through 10.

13. Adjust OBOGS Adapter Assembly Regulator knob (4) until 25 psig as indicated on AIR-OXYGEN PRESSURE gage (G1) on the High Pressure Swing and repeat steps 7 through 12.

14. Repeat steps 8 through 10, with the following exception, pressure in step 8 shall be adjusted to 25 psig.

15. If readings are not within tolerance, refer to paragraph 4-62 Troubleshooting. If readings are within tolerance, secure test set and OBOGS adapter assembly as follows.

16. Turn FLOW SELECT valve (V2) to LOW position.

17. Back off OBOGS Adapter Assembly Regulator knob (4) until a zero pressure reading is indicated on OBOGS Adapter Assembly Gage (5) and AIR-OXYGEN PRESSURE gage (G1).

18. Turn FLOW PRESSURE CONTROL valve (RG2) counterclockwise until spring tension is released.

19. Set CONC ON switch (S1) to OFF.

20. Set CONC FLOW valve (V4) and OXY ANALYZER valve (V3) to CLOSED.

21. Turn OBOGS Adapter Assembly Valve (3) to OFF position.

22. Shutoff Air Source Supply Valve (2). Open OBOGS Adapter Assembly Bleed Ports (9) until Air Source gage (1) bleeds to zero psig.

23. Close Bleed Ports (9).

24. Set 28 V DC ON circuit breaker (CB1) to OFF. Turn 28 V DC power supply to test set OFF.

25. Remove 28 V DC power cable from 28-volt power supply and test set connector (J10) and install cap on connector (J10).

26. Remove concentrator cable assembly from 28 V DC CONC POWER (J11) and concentrator electrical connector. Install cap on connector (J11).

27. Remove OBOGS Adapter Assembly Inlet Hose (11) from OBOGS Adapter Assembly Inlet Connection (6) and Shop Air Source.

28. Disconnect OBOGS Adapter Assembly Outlet Hose (10) from OBOGS Adapter Assembly Outlet Port (8) and concentrator inlet port.

29. Remove concentrator outlet hose assembly from concentrator outlet fitting (2) and OXY FROM CONC fitting (J3) of test set.

30. Remove muffler assembly from concentrator.

31. Install protective shipping caps on all removed components and store in lid of test set.

32. Ensure switches and valves are in the same position as in Display Lamp Test paragraph 4-40, steps 1 through 8.

33. Ensure that test set caps, cover, and screw assemblies are installed on their applicable fittings.

34. Stow all test set components in test set, place test set lid on test set case. Secure lid to case by using the 8 latches attached to lid

35. Stow all OBOGS Adapter Assembly hoses in box and secure box.

4-46. BENCH TEST USING MODEL TTU-518A/E TEST SET ONLY.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	1779AS522-1
1	Cable Assembly, Concentrator	1779AS127-1
1	Cable Assembly, Power Supply	1779AS180-1
1	Concentrator Test Set, Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Filter Assembly, Inlet	1779AS581-1
1	Hose Assembly, Inlet	1779AS133-1
1	Hose Assembly, Outlet	1779AS134-1
1	Muffler Assembly	1779AS578-1
1	Regulator, Pressure	283028-0001 (CAGE 9657) NIIN 01-101-8827 or Equivalent

4-47. Display Lamp Test. To perform the Display Lamp Test, proceed as follows:

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings, tools, and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc.) and any other combustible materials. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

CAUTION

Do not lift or carry the OEAS oxygen concentrator by the exhaust vent tube assembly of the rotary valve assembly. Damage to the OEAS oxygen concentrator will occur.

1. Ensure circuit breaker INSTM on (CB3) is in the reset (push in to reset) position.

2. Ensure 28 VDC ON circuit breaker (CB1) and 115 VAC ON circuit breaker (CB2) are OFF.

3. Ensure CONC ON/OFF switch (S1) is OFF.

4. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

5. Turn FLOW SELECT valve (V2) to LOW position.

6. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are closed.

7. Ensure AIR PRESSURE CONTROL (RG1) and FLOW PRESSURE CONTROL (RG2) are backed out counterclockwise until spring tension is released.

8. Ensure test panel vent located adjacent to flow pressure gage (G2) is not blocked or covered.

9. Remove all hoses, adapters, muffler, and filters from test set lid assembly.

NOTE

Index numbers refer to figure 4-5 unless otherwise stated.

10. Remove cap from concentrator test set AIR TO CONC fitting (J4) and connect inlet hose (P/N 1779AS133-1) to inlet fitting (1) of concentrator and AIR TO CONC fitting (J4) of test set.

11. Remove cap from concentrator test set OXY FROM CONC fitting (J3) and connect outlet hose (P/N 1779AS134-1) and adapter (P/N 1779AS522-1) to outlet fitting (2) of concentrator and OXY FROM CONC fitting (J3) of test set.

CAUTION

Do not restrict exhaust flow from concentrator by any means other than the muffler assembly.

12. Connect muffler assembly to exhaust vent tube (3) of concentrator.

13. Uncap OXY EXHAUST port (J5) of test set.

14. Remove cap from concentrator test set filter pod fitting (J1) and connect inlet filter assembly to filter port fitting (J1).

15. Connect a 90 to 120 psig regulated clean, dry air source capable of supplying 26 SCFM to the inlet filter assembly.

CAUTION

Do not connect 28 Vdc return and case ground together; allow 28 Vdc to float.

16. Remove cap from concentrator test set 28 Vdc connector (J10) and connect power supply cable (P/N 1779AS180-1) to test set 28 Vdc connector (J10) and 28 Vdc power supply. The connector on power supply end of the cable is an MS3106A16-11P. Pin B is +28 Vdc (Pos) and Pin A is return (Neg). The connector shell is ground.

17. Remove cap from concentrator test set CONC POWER connector (J11) and connect concentrator cable assembly (P/N 1779AS127-1) test set CONC POWER connector (J11) and concentrator electrical connector (4).

18. Turn on power supply.

19. Turn 28 VDC ON circuit breaker (CB1) to ON. DS1 and DS3 lamps will illuminate. DS3 lamp will extinguish after 3 minutes indicating test set is ready for use.

20. Push display TEST (S2), RG4 HEATER lamp (DS3), Heater No. 1 (DS4), Heater No. 2 (DS5) and 115V Heater (DS6) shall illuminate. Release display TEST (S2). They shall extinguish. Record reading on Performance Test Sheet.

21. Turn on shop air supply, INLET pressure gage (G3) should indicate 90 to 120 psig.

22. Continue to paragraph 4-48.

4-48. Motor Heater Solenoid Current Test. To perform the Motor Heater Solenoid Current Test, proceed as follows:

NOTE

Heaters will not be required if the air temperature is above 110°F. After concentrator warmup has stabilized, either lamp DS4 or DS5 should be off. The other lamp will cycle on and off. (It is possible for either heater to cycle during normal use.)

CAUTION

CONC ON switch (S1) power and RG1 pressure should be applied as close together as possible. Damage to the concentrator may occur if RG1 pressure is applied to the concentrator prior to energizing the rotary valve motor. The rotary valve motor should not be energized for extended periods without air pressure applied to the concentrator.

1. Set CONC ON switch (S1) to on and adjust AIR PRESSURE CONTROL (RG1) until AIR-OXY PRESSURE gage (G1) reads 25 psig. 28V HEATER lamps (DS4 and DS5) one or both will illuminate and then extinguish. Ensure audible operation of concentrator rotary valve motor and observe 28V MOTOR meter (M1) for indication (1.8 to 2.5 amps). Record MOTOR meter (M1) reading on the Performance Test Sheet.

2. If readings are within tolerance, proceed to Motor Valve RPM Test, paragraph 4-49. If readings are not within tolerance, refer to Troubleshooting (paragraph 4-63).

4-49. Motor Valve RPM Test. To perform the Motor Valve RPM Test, proceed as follows:

NOTE

When performing steps 1 and 2, the concentrator should cycle 11 to 13 times in one minute. The cycles will be indicated by a sudden rapid drop in pressure displayed on AIR-OXY PRESSURE gage (G1), followed by a return to normal pressure. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to the concentrator exhaust port.

1. Ensure PRESSURE SELECT valve (V1) is in the AIR TO CONC position.

2. Count the number of pressure drops that occur during one minute, number of pressure drops shall be 11 to 13. Record number of pressure drops on Performance Test Sheet.

3. If number of pressure drops are within tolerance, proceed to Pressure Reducer Test (paragraph 4-50). If number of pressure drops are not within tolerance, refer to Troubleshooting (paragraph 4-63).

4-50. Pressure Reducer Test. To perform the Pressure Reducer Test, proceed as follows:

1. Open CONC FLOW valve (V4).

CAUTION

To prevent damage to FLOW PRESSURE gage (G2) during step 2, slowly open FLOW PRESSURE CONTROL valve (RG2) while observing movement of FLOW PRESSURE gage (G2) indicator.

2. Slowly adjust FLOW PRESSURE CONTROL valve (RG2) until FLOW PRESSURE gage (G2) indicates 30 inH_2O.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until AIR-OXY PRESSURE gage (G1) indicates 60 ±1 psig.

4. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position. AIR-OXY PRESSURE gage (G1) should indicate 30 to 37 psig during high pressure swing, record reading from AIR-OXY PRESSURE gage (G1) on Performance Test Sheet.

5. If reading from AIR-OXY PRESSURE gage (G1) is within tolerance, proceed to Internal Leakage Test (paragraph 4-51). If reading from AIR-OXY PRESSURE gage (G1) is not within tolerance, refer to Troubleshooting (paragraph 4-63).

4-51. Internal Leakage Test. To perform the Internal Leakage Test, proceed as follows:

1. Close OXY ANALYZER valve (V3) and CONC FLOW valve (V4).

2. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until 60 psig is indicated on AIR-OXY PRESSURE gage (G1).

4. Set CONC ON switch (S1) to OFF position.

5. Adjust AIR PRESSURE CONTROL valve (RG1) until 5 psig is indicated on AIR-OXY PRESSURE gage (G1).

6. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and record initial reading from AIR-OXY PRESSURE gage (G1) on Performance Test Sheet.

NOTE

After taking initial reading in step 7, note time. After waiting one minute, note pressure on AIR-OXY PRESSURE gage (G1). Pressure drop shall not exceed 3 psig. If pressure drop exceeds 3 psig, continue the test for 5 minutes. If the pressure drop does not exceed 15 psig, the test is satisfactory.

7. Observe AIR-OXY PRESSURE gage (G1) for one minute; pressure drop shall not exceed 3 psig. Record reading on Performance Test Sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop shall not exceed 15 psig. Record reading on Performance Test Sheet.

8. Set CONC FLOW valve (V4) to OPEN position.

9. Set CONC ON switch (S1) to ON position.

10. If final reading for internal leakage test is within tolerance, proceed to Oxygen Flow and Air Filter Bleed Flow Test (paragraph 4-53). If final reading for Internal Leakage Test is not within tolerance, refer to Troubleshooting (paragraph 4-63).

NOTE

Monitor Test (paragraph 4-52) is performed daily in accordance with the applicable support equipment technical publication. Therefore, paragraph 4-52 need only be performed if the concentrator being tested fails the Oxygen Flow Test.

4-52. Monitor Test. In order to prevent unnecessary replacement of concentrator sieve beds, the Monitor Test is performed only if the concentrator fails the Oxygen Flow and Air Filter Bleed Flow Test (paragraph 4-53). To perform the Monitor Test, refer to the appropriate support equipment technical manual.

4-53. Oxygen Flow and Air Filter Bleed Flow Test. To perform the Oxygen Flow and Air Filter Bleed Flow Test, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

While performing oxygen flow test, ensure that while the concentrator is operating (CONC ON switch S1 to ON) the reading on INLET PRESSURE gage (G-3) does not fall below 90 psig. If the pressure reading does fall below 90 psig, the air supply or filter assembly is inadequate and does not meet specified requirements.

Ensure air filter assembly has been modified in accordance with paragraph 4-96.

1. Adjust air pressure control valve (RG1) until 25 psig is indicated on AIR-OXY PRESSURE gage (G1).

2. Record on Performance Test Sheet if air is bleeding through inlet filter assembly bleed orifice.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until 0 psig is indicated on AIR-OXY PRESSURE gage (G1).

4. Ensure CONC POWER switch (S1) is in the ON position.

5. Set OXY ANALYZER valve (V3) to OPEN position.

6. Ensure CONC FLOW valve (V4) is in the OPEN position.

7. Adjust AIR PRESSURE CONTROL valve (RG1) until 8 psig is indicated on AIR-OXY PRESSURE gage (G1).

8. Turn FLOW SELECT valve (V2) to HIGH position.

9. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inH_2O is indicated on FLOW PRESSURE gage (G2).

10. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position, and adjust air pressure control valve (RG1) to 8 psig as indicated on AIR-OXY PRESSURE gage (G1).

11. Maintain 30 in H_2O as indicated on FLOW PRESSURE gage (G2). Allow reading on % OXYGEN meter (M3) to stabilize.

NOTE

When taking reading from AIR-OXY PRESSURE gage (G1), there will be a pressure swing; record both the low and high pressure indications on Performance Test sheet.

12. Record readings from AIR-OXY PRESSURE gage (G1) and % OXYGEN meter (M3) on Performance Test Sheet. Readings shall meet the requirement listed on Performance Test Sheet.

13. Turn FLOW SELECT valve (V2) to MED position and repeat steps 9 through 12.

14. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 9 through 12.

15. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

16. Adjust AIR PRESSURE CONTROL valve (RG1) until 25 psig is indicated on AIR-OXY PRESSURE gage (G1).

17. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and repeat steps 8 through 14, with the following exception, pressure in step 10 shall be adjusted to 25 psig.

18. If readings are not within tolerance, refer to Troubleshooting (paragraph 4-63). If readings are within tolerance, secure from testing as follows:

19. Turn FLOW PRESSURE CONTROL valve (RG2) counterclockwise until spring tension is released.

20. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

21. Set CONC ON switch (S1) and 28 VDC circuit breaker (CB1) to OFF position.

22. Turn off 28 Vdc power supply.

23. Turn AIR PRESSURE CONTROL valve (RG1) counterclockwise until spring tension is released.

24. Set OXY ANALYZER valve (V3) and CONC FLOW valve (V4) to CLOSED position.

25. Shut off shop air supply.

26. Disconnect all hoses and cable assemblies, muffler, and inlet filter from test set and concentrator and install in lid of test set.

27. Reinstall all protective caps on test set and concentrator.

4-54. BENCH TEST USING MODEL TTU-518A/E TEST SET WITH OBOGS ADAPTER ASSEMBLY P/N 3248AS200-1.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly	1779AS522-1
1	Cable Assembly, Concentrator	1779AS127-1
1	Cable Assembly, Power Supply	1779AS180-1
1	Concentrator Test Set, Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Filter Assembly, Inlet	1779AS581-1
1	Hose Assembly, Inlet	1779AS133-1
1	Hose Assembly, Outlet	1779AS134-1
1	Muffler Assembly	1779AS578-1
1	Regulator, Pressure	283028-0001 (CAGE 9657) NIIN 01-101-8827 or Equivalent

4-55. Display Lamp Test. To set up the test set and check out its display lamps utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings, tools and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc) and any other combustible materials. Fire or explosion may result when even slight traces of combustible material are exposed to oxygen under pressure.

CAUTION

Do not lift or carry the oxygen concentrator by the exhaust vent metallic tube assembly. Damage to the oxygen concentrator will occur.

NOTE

Paragraphs 4-55 through 4-60 contain the procedural steps for testing of the GGU-7/A oxygen concentrator utilizing Model Test Set TTU-518A/E with the OBOGS ADAPTER Assembly part number (3248AS200-1) as a work around test fixture only.

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Ensure test set lid is removed and circuit breaker INSTM ON (CB3) is in the RESET position (pushed in).

2. Open OBOGS ADAPTER assembly box (7).

3. Turn on OBOGS Adapter Assembly valve (3).

4. Ensure circuit breakers 28 V DC ON (CB1) and CONC ON switch (S1) are OFF.

5. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position.

6. Turn FLOW SELECT valve (V2) to LOW position.

NOTE

OXY ANALYZER (V3) and CONC FLOW (V4) are toggle valves. They are closed when the black handle is parallel to the panel assembly. They are open when the black handle is perpendicular to the panel assembly.

7. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are in the closed position.

NOTE

AIR PRESSURE CONTROL valve (RG1) will not be used for testing during this procedure.

8. Ensure adjusting knob of AIR PRESSURE CONTROL (RG1) is turned counterclockwise four turns or until spring tension is released.

9. Ensure adjusting knob of FLOW PRESSURE CONTROL (RG2) is turned counterclockwise four turns or until spring tension is released.

10. Ensure test set panel vent located next to FLOW PRESSURE gage (G2) is not blocked or covered.

11. Remove all hoses, cables, adapters, filters, and muffler from lid of concentrator test set.

12. Remove cap assembly from concentrator OXY FROM CONC (J3).

13. Cap AIR TO CONC (J4) and FILTER PORT (J1).

14. Remove protective shipping caps and connect one end of concentrator outlet hose assembly (P/N 1779AS134-1) to OXY FROM CONC fitting (J3) of test set. Connect other end of outlet hose to concentrator outlet fitting.

15. Remove protective shipping plugs and connect one end of OBOGS Adapter Assembly Outlet Hose Assembly (10) to OBOGS Adapter Assembly Outlet Port (8). Connect other end of OBOGS Adapter Assembly Outlet Hose (10) to concentrator inlet port.

CAUTION

Do not restrict exhaust flow from concentrator by any means other than the muffler assembly.

16. Connect muffler assembly (P/N 3306270-1 or 3306268-1) to concentrator vent tube.

17. Remove protective shipping cap from OXY EXHAUST port (JS) of test set.

18. Remove protective shipping caps from 28 V DC power supply cable assembly (P/N 1779AS108-1).

CAUTION

Do not connect 28 V DC return and case ground together. Allow 28 V DC to float.

NOTE

Power supply end of cable is (P/N MS3106A16-11P) (Pin B is 28 V DC and pin A is return negative). The connector shell is case ground.

19. Remove cap from test set 28 V DC connector (J10). Connect 28V DC cable (P/N 1779AS108-1) to 28 V DC connector (J10) and to 28 V DC power supply Connector.

20. Turn on power supply.

WARNING

Hazardous voltages may be present on case of the test set if power plug and source are not connected to safety ground (green wire).

21. Set 28 V DC ON circuit breaker (CB1) to ON. Lamp (DS1) and meter (M3) will illuminate. RG4 HEATER lamp (DS3) will illuminate then extinguish in approximately 3 minutes, indicating the monitor is operating within temperature limits.

22. Remove cap assembly from 28V CONC POWER (J11) on test set.

23. Remove protective shipping covers from concentrator cable assembly (P/N 1779AS127-1). Connect one end of cable to 28 V DC CONC POWER (J11) and connect the other end to the concentrator electrical connector.

NOTE

% OXYGEN meter (M3) will initially read 0.5% and should stabilize at approximately 20% or higher within 5 minutes.

24. Push Test Display button (S2). Lamps (DS3), (DS4), (DS5), and (DS6) shall illuminate and extinguish when (S2) is released.

25. Ensure that the adjusting knob of OBOGS Adapter Assembly Regulator (4) is turned counterclockwise four turns or until spring tension is released.

NOTE

AIMD intermediate level maintenance shops will require an ON/OFF valve (2) and a 0 to 160 psig gage (1) or suitable substitutes installed on shop air supply source prior to the OBOGS Adapter Assembly Inlet. (Figure 4-6) shall be used for orientation of assembly.

26. Connect OBOGS Adapter Assembly Hose (11) to OBOGS Adapter Assembly INLET Port (6). Connect the other end of OBOGS Adapter Assembly Hose (11) to shop air source.

27. Turn on shop air supply. Pressure will be indicated on Shop Air Supply gage (1). At no time during operation shall Shop Air Supply gage (1) fall below 75 psig during the high-pressure swing.

28. Open OBOGS Adapter Assembly Bleed Ports (9) 1/4 to 1/2 turn until a slight bleed is present.

NOTE

Heaters will not be required if the air temperature is above 110°F. After concentrator warm-up has stabilized, either meter M2 or M3 should read zero. The other meter will cycle on and off. (It is possible for either heater to cycle during normal use.)

29. Set CONC ON switch (S1) to ON and record on a Performance Test Sheet the initial reading indicated on MOTOR SOLENOID indicator (M1) (initial reading 1.5 to 2.5 amps which decrease to a continuous reading of 1.5 to 2.5 amps).

30. Place CONC FLOW valve (V4) to the OPEN position.

31. Adjust OBOGS Adapter Assembly Regulator knob (4) until 25 psig is indicated on FLOW PRESSURE gage (G1) during high-pressure swing.

32. If readings are within tolerance, proceed to motor heater solenoid current test paragraph 4-56. If readings are not within tolerance, refer to paragraph 4-63, Troubleshooting.

4-56. Motor Heater Solenoid Current Test. To perform the motor heater solenoid test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

Meters M1, M2, and M3 should indicate as follows:
MOTOR SOLENOID (M1), 1.5 to 2.5 amps
HEATER NO. 1 (M2), 7 to 10 amps or monetary cycling
HEATER NO. 2 (M3), 7 to 10 amps or monetary cycling

1. Turn CONC ON switch (S1) to OFF then to ON, record reading from meter (M1) on performance test sheet.

2. If readings are within tolerance proceed to motor valve rpm test paragraph 4-57. If readings are not within tolerance refer to paragraph 4-63, Troubleshooting.

4-57. Motor Valve RPM Test. To perform the motor valve rpm test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

When performing steps 1 and 2, the concentrator should cycle 11 to 13 times in one minute. The cycles will be indicated by a sudden rapid drop in pressure displayed on AIR/OXY PRESSURE gage (G1), followed by a return to normal pressure per revolution. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to concentrator exhaust port.

1. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

2. Count the number of pressure drops that occur during one minute, The number of pressure drops shall be 11 to 13. Record number of pressure drops on performance test sheet.

3. If the numbers of pressure drops are within tolerance proceed to pressure reducer test paragraph 4-58. If number of pressure drops are not within tolerance refer to paragraph 4-63, Troubleshooting.

4-58. Pressure Reducer Test. To perform the pressure reducer test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

2. Adjust OBOGS ADAPTER OBOGS Adapter Assembly Regulator knob (4) until OBOGS Adapter Assembly Gage (5) indicates 60 ±1 psig during high-pressure swing. AIR/OXYGEN PRESSURE gage (G1) should indicate 30 to 37 psig during high-pressure swing. Record reading from AIR/OXYGEN PRESSURE gage (G1) on performance test sheet.

3. If reading from AIR/OXYGEN PRESSURE gage (G1) is within tolerance, proceed to internal leakage test, paragraph 4-59. If reading from AIR/OXYGEN PRESSURE gage (G1) is not within tolerance, refer to paragraph 4-63, Troubleshooting.

4-59. Internal Leakage Test. To perform the internal leakage test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

NOTE

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Adjust OBOGS Adapter Assembly Regulator knob (4) until OBOGS Adapter Assembly Gage (5) indicates 60 ±1 psig during high-pressure swing.

2. Ensure PRESSURE SELECT valve (V1) is in the OXY FROM CONC position.

3. Close CONC FLOW valve (V4).

4. Adjust OBOGS Adapter Assembly Regulator knob (4) until 10 psig is indicated on OBOGS Adapter Assembly Gage (5).

5. Record initial reading from AIR-OXY Pressure Gage (G 1) on performance test sheet.

NOTE

After taking initial reading in step 7, note time, and wait one minute then note pressure on AIR-OXY PRESSURE gage (G1). Pressure drop shall not exceed 3 psig. If pressure drop exceeds 3 psig, continue the test for 5 minutes pressure drop shall not exceed 15 psig. Record reading on performance test sheet.

6. Observe AIR-OXY PRESSURE gage (G1) for one minute, pressure drop shall not exceed 3 psig. Record reading on performance test sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop shall not exceed 15 psig. Record reading on performance test sheet.

7. Set CONC FLOW valve (V4) to OPEN position.

8. If final reading for internal leakage is within tolerance, proceed to oxygen flow and air filter bleed flow test (paragraph 4-60). If final reading for internal leakage test is not within tolerance, refer to paragraph 4-63, Troubleshooting.

4-60. Oxygen Flow Test and Air Filter Bleed Flow Test. To perform the oxygen flow test/filter drain test utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

While performing the oxygen flow test, ensure that while the concentrator is operating (CONC ON switch (S1) is On) that the reading on Air Supply gage (1) has a peak reading of 75 psig or higher on the high pressure swing. If the pressure reading falls below 75 psig on the high swing, the air supply, concentrator filter assembly or OBOGS adapter filter system is inadequate and does not meet the specified requirements.

Figure 4-6 will be used for all index numbers throughout this procedure unless otherwise noted.

1. Adjust OBOGS Adapter Assembly Regulator knob (4) until 50 psig is indicated on OBOGS Adapter Assembly Gage (5).

2. Record on performance test sheet if air is bleeding through inlet filter assembly bleed orifice.

CAUTION

To prevent damage to FLOW PRESSURE gage (G2), slowly open FLOW PRESSURE CONTROL valve (RG2) while observing movement of gage (G2) indicator.

3. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inH_2O indicated on FLOW PRESSURE gage (G2) on the high-pressure swing.

4. Adjust OBOGS Adapter Assembly Regulator knob (4) until 8 psig is indicated on AIR/OXY PRESSURE gage (G1) on the high-pressure swing.

5. Ensure CONC FLOW valve (V4) is in the OPEN position.

6. Set OXY ANALYZER valve (V3) to OPEN position.

7. Turn FLOW SELECT valve (V2) to HIGH position.

8. Adjust OBOGS Adapter Assembly Regulator knob (4) until to 8 psig as indicated on AIR/OXYGEN PRESSURE gage (G1) on the High Pressure Swing.

9. Maintain 30 inH_2O at high-pressure swing as indicated on FLOW PRESSURE gage (G2) on the high-pressure swing. Allow reading on % OXYGEN meter (M3) to stabilize approximately 5 minutes.

NOTE

When taking reading from AIR/OXY PRESSURE gage (G1), there will be a pressure swing. Record both the low and high-pressure indications on the performance test sheet.

10. Record readings from on AIR-OXYGEN PRESSURE gage (G1) and reading from % OXYGEN meter (M3) on performance test sheet. Readings shall meet the requirement listed on performance test sheet.

11. Turn FLOW SELECT valve (V2) to MED position and repeat steps 8 through 10.

12. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 8 through 10.

13. Adjust OBOGS Adapter Assembly Regulator knob (4) until 25 psig as indicated on AIR-OXYGEN PRESSURE gage (G1) on the High Pressure Swing and repeat steps 7 through 12.

14. Repeat steps 8 through 10, with the following exception, pressure in step 8 shall be adjusted to 25 psig.

15. If readings are not within tolerance, refer to paragraph 4-63, Troubleshooting. If readings are within tolerance, secure test set and OBOGS Adapter Assembly as follows.

16. Turn FLOW SELECT valve (V2) to LOW position.

17. Back off OBOGS Adapter Assembly Regulator knob (4) until a zero pressure reading is indicated on OBOGS Adapter Assembly Gage (5) and AIR-OXYGEN PRESSURE gage (G1).

18. Turn FLOW PRESSURE CONTROL valve (RG2) counterclockwise until spring tension is released.

19. Set CONC ON switch (S1) to OFF.

20. Set CONC FLOW valve (V4) and OXY ANALYZER valve (V3) to CLOSED.

21. Turn OBOGS Adapter Assembly Valve (3) to OFF position.

22. Shutoff Air Source Supply Valve (2). Open OBOGS Adapter Assembly Bleed Ports (9) until Air Source gage (1) bleeds to zero psig.

23. Close Bleed Ports (9).

24. Set 28 V DC ON circuit breaker (CB1) to OFF. Turn 28 V DC power supply to test set OFF.

25. Remove 28 V DC power cable from 28-volt power supply and test set connector (J10) and install cap on connector (J10).

26. Remove concentrator cable assembly from 28 V DC CONC POWER (J11) and concentrator electrical connector. Install cap on connector (J11).

27. Remove OBOGS Adapter Assembly Inlet Hose (11) from OBOGS Adapter Assembly Inlet Connection (6) and Shop Air Source.

28. Disconnect OBOGS Adapter Assembly Outlet Hose (10) from OBOGS Adapter Assembly Outlet Port (8) and concentrator inlet port.

29. Remove concentrator outlet hose assembly from concentrator outlet fitting (2) and OXY FROM CONC fitting (J3) of test set.

30. Remove muffler assembly from concentrator.

31. Install protective shipping caps on all removed components and store in lid of test set.

32. Ensure switches and valves are in the same position as in Display Lamp Test paragraph 4-47, steps 1 through 8.

33. Ensure that test set caps, cover, and screw assemblies are installed on their applicable fittings.

34. Stow all test set components in test set, place test set lid on test set case. Secure lid to case by using the 8 latches attached to lid

35. Stow all OBOGS Adapter Assembly hoses in box and secure box.

4-61. TROUBLESHOOTING.

4-62. TROUBLESHOOTING (MODEL TTU-452A/E TEST SET ONLY). Troubleshooting is prepared in a logical sequence. Due to the complex wiring and etc., each step will identify the type of test or inspection (with tolerances) to be performed with the expected end results. All tests and steps permit only two outcomes. Each item to be replaced is identified in replacement steps. After performing a repair task, recheck the operation of the concentrator component. If the malfunction is corrected, that is the end of the procedure; if not, proceed to the next step in the troubleshooting table or to the next troubleshooting table indicated. Use troubleshooting tables 4-2 through 4-17 as applicable. Once the malfunction has been corrected, return to Bench Test procedures and continue bench testing the concentrator. To troubleshoot the concentrator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Compound, Cleaning, Oxygen, Type IIA	MIL-C-81302 NIIN 00-105-3084
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Concentrator	3306265-1
1	Cable Assembly, Power Supply	3306284-1
1	Concentrator Test Set Model TTU-452A/E	1779AS100-2 (CAGE 30003)
1	Multimeter	Fluke 77/AN (CAGE 89536) or equivalent
1	Wire, Lead, Test	ALB24RED (CAGE 05276) NIIN 00-175-1418
1	Regulator, Pressure	283028-0001 (CAGE 99657) NIIN 01-101-8827 or equivalent

NOTE

When troubleshooting components which do not have electrical wiring or do not receive power through the electronics box assembly, performance of steps 1 through 7 is not necessary.

1. Turn off shop air supply and all power to test set.

2. Disconnect concentrator from test set, but do not remove test set 28 Vdc cable assemblies (P/N 3306284-1 or 3306265-1), since they will be needed for troubleshooting to isolate the malfunction.

NOTE

Index numbers in steps 3, 4, and 5, refer to figure 4-7.

3. Remove pressure reducer assembly (1) from concentrator by cutting tiedown straps (2), remove two screws (3) washers (4), two screws (5) washers (6) and performed packings (7) and (8).

4. Remove five screws (9) securing cover (10) to terminal strip (11). Cut and remove two tiedown straps (12).

CAUTION

Cover is secured to terminal strip with adhesive and may be difficult to remove. Pry cover off taking care not to damage or break electrical wiring or terminal cover.

5. Remove cover (10) from terminal strip (11).

NOTE

Tag all electrical leads prior to removing.

CAUTION

Electrical leads and attaching hardware of the terminal strip are installed and secured in place with a coating of RTV silicon adhesive. Use extreme care during disassembly.

6. Carefully remove RTV adhesive covering screws securing leads of three thermistor wires at terminals 1 and 2 (figure 4-8) and remove screws. Place blade of screwdriver flat under terminal lead and carefully press down and back until lead is free of terminal board. Repeat for all leads to be removed. Carefully remove remaining RTV adhesive.

7. Connect concentrator cable assembly (P/N 3306265-1) from test set to concentrator electrical connector (13, figure 4-7).

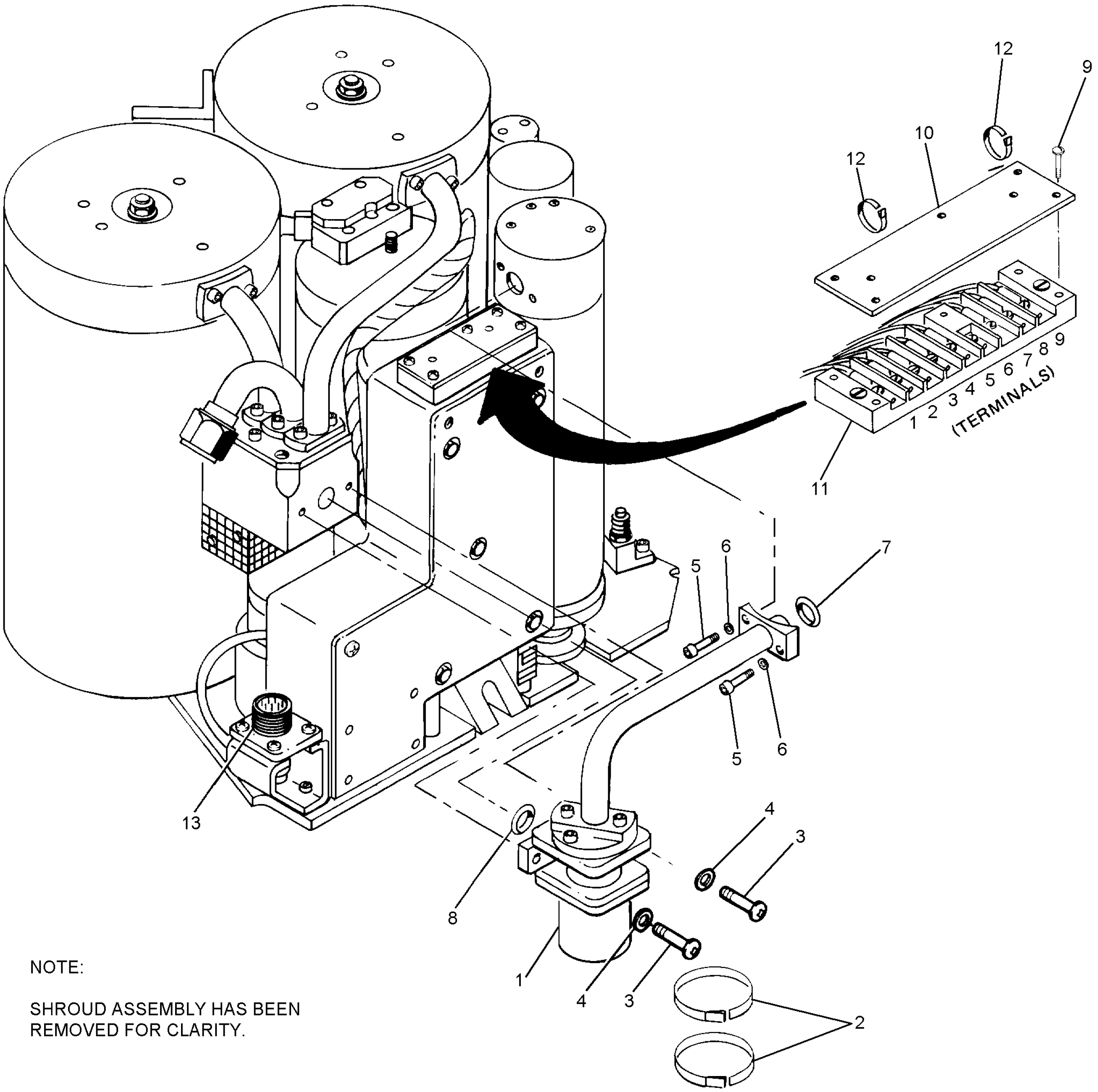
WARNING

Operating heater for more than one minute without air flowing through concentrator will cause heater and inlet fitting to become very hot and could cause severe burns when touched, or result in damage to the concentrator. Limit heater operation to time required to obtain reading then disable heater by turning CONC switch (S1) to OFF.

NOTE

Terminals 1, 2, and 3 limited current voltage with limited current. Connections may be made with concentrator and test set with power on without risk. Terminals 4 and 5 are 20 to 30 Vdc and terminals 7 and 9 are each less than 30 Vac. Terminal 8 can reach peak voltages of 90 Vac, which is not considered hazardous.

8. Troubleshooting the concentrator using troubleshooting tables 4-2 through 4-16 as applicable.



1. PRESSURE REDUCER ASSEMBLY
2. TIEDOWN STRAPS
3. SCREW
4. WASHER
5. SCREW
6. WASHER
7. PREFORMED PACKING
8. PREFORMED PACKING
9. SCREW
10. COVER
11. TERMINAL STRIP
12. TIEDOWN STRAP
13. RECEPTACLE CONNECTOR

004007

Figure 4-7. Troubleshooting Set-up

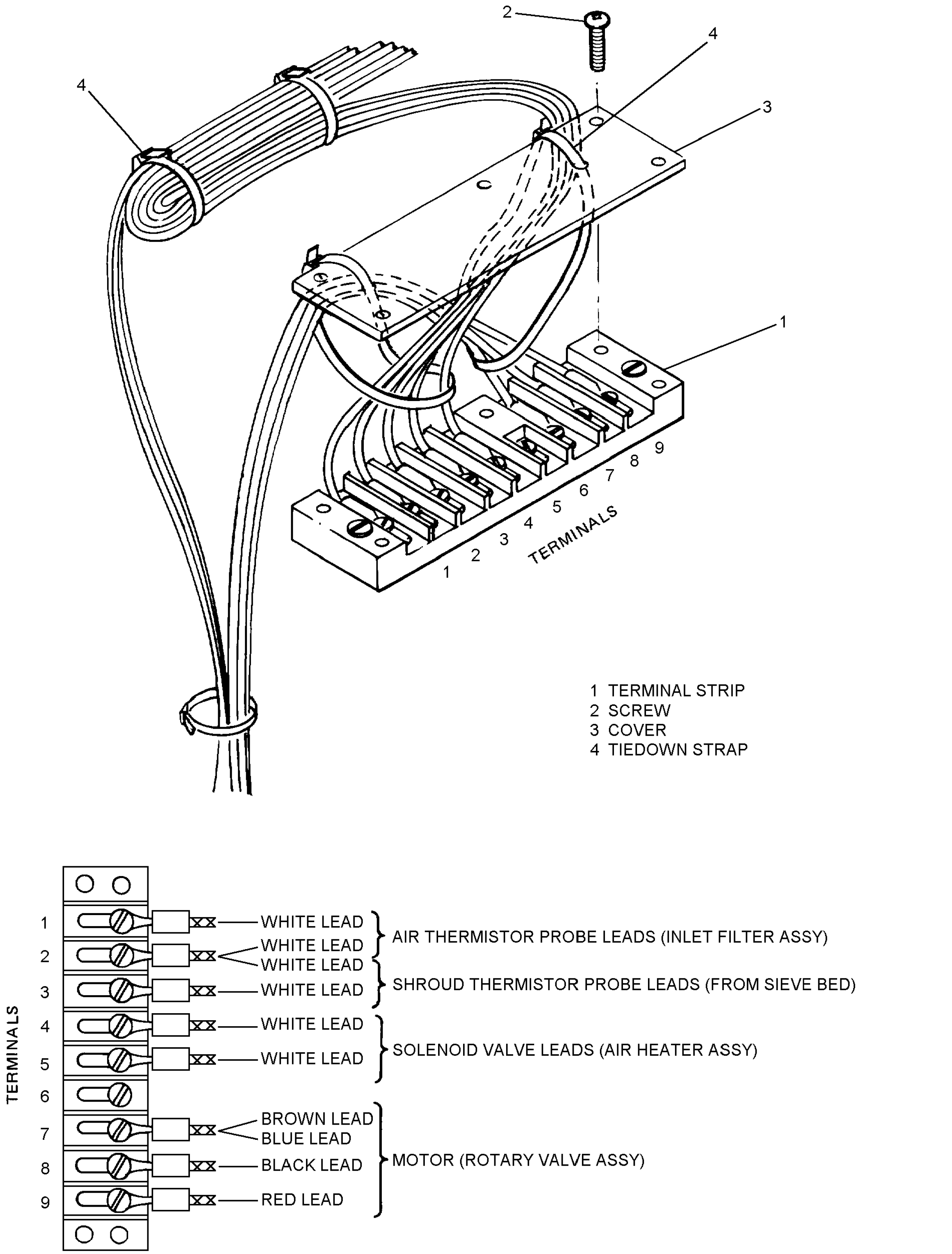


Figure 4-8. Terminal Strip Wiring

4-63. TROUBLESHOOTING (MODEL TTU-518A/E TEST SET ONLY). Troubleshooting is prepared in a logical sequence. Due to the complex wiring and etc., each step will identify the type of test or inspection (with tolerances) to be performed with the expected end results. All tests and steps permit only two outcomes. Each item to be replaced is identified in replacement steps. After performing a repair task, recheck the operation of the concentrator component. If the malfunction is corrected, that is the end of the procedure; if not, proceed to the next step in the troubleshooting table or to the next troubleshooting table indicated. Use troubleshooting tables 4-3 through 4-17 as applicable. Once the malfunction has been corrected, return to Bench Test procedures and continue bench testing the concentrator. To troubleshoot the concentrator, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Aviators Breathing Oxygen	MIL-O-27210
As Required	Compound, Cleaning, Oxygen, Type IIA	MIL-C-81302 NIIN 00-105-3084
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Cable Assembly, Concentrator	1779AS127-1
1	Cable Assembly, Power Supply	1779AS180-1
1	Concentrator Test Set Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Multimeter	Fluke 77/AN (CAGE 89536) or equivalent
1	Wire, Lead, Test	ALB24RED (CAGE 05276) NIIN 00-175-1418
1	Regulator, Pressure	283028-0001 (CAGE 99657) NIIN 01-101-8827 or equivalent

NOTE

When troubleshooting components which do not have electrical wiring or do not receive power through the electronics box assembly, performance of steps 1 through 7 is not necessary.

1. Turn off shop air supply and all power to test set.

2. Disconnect concentrator from test set, but do not remove test set 28 Vdc cable assemblies (P/Ns 1779AS180-1 or 1779AS127-1), since they will be needed for troubleshooting to isolate the malfunction.

NOTE

Index numbers in steps 3, 4, and 5, refer to figure 4-7.

3. Remove pressure reducer assembly (1) from concentrator by cutting tiedown straps (2), remove two screws (3) washers (4), two screws (5) washers (6) and performed packings (7) and (8).

4. Remove five screws (9) securing cover (10) to terminal strip (11). Cut and remove two tiedown straps (12).

CAUTION

Cover is secured to terminal strip with adhesive and may be difficult to remove. Pry cover off taking care not to damage or break electrical wiring or terminal cover.

5. Remove cover (10) from terminal strip (11).

NOTE

Tag all electrical leads prior to removing.

CAUTION

Electrical leads and attaching hardware of the terminal strip are installed and secured in place with a coating of RTV silicon adhesive. Use extreme care during disassembly.

6. Carefully remove RTV adhesive covering screws securing leads of three thermistor wires at terminals 1 and 2 (figure 4-8) and remove screws. Place blade of screwdriver flat under terminal lead and carefully press down and back until lead is free of terminal board. Repeat for all leads to be removed. Carefully remove remaining RTV adhesive.

7. Connect concentrator cable assembly (P/N 1779AS127-1) from test set to concentrator electrical connector (13, figure 4-7).

WARNING

Operating heater for more than one minute without air flowing through concentrator will cause heater and inlet fitting to become very hot and could cause severe burns when touched or result in damage to the concentrator. Limit heater operation to time required to obtain reading then disable heater by turning CONC switch (S1) to OFF.

NOTE

Terminals 1, 2, and 3 limited current voltage with limited current. Connections may be made with concentrator and test set with power on without risk. Terminals 4 and 5 are 20 to 30 Vdc and terminals 7 and 9 are each less than 30 Vac. Terminal 8 can reach peak voltages of 90 Vac, which is not considered hazardous.

8. Troubleshooting the concentrator using troubleshooting tables 4-2 through 4-17 as applicable.

Table 4-2. Troubleshooting (Heater No. 1 (M2) and Heater No. 2 (M3) (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
Test set meter (M2) and (M3) both indicate 7 to 10 amps and do not cycle on to off.	Thermistor (RT1) leads are open in circuit, electronics box has shorted output transistor or heater drive circuit.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Turn on 28 Vdc POWER supply and set CONC circuit breaker (CB1) test set POWER to ON position.

2. Attach test lead wire (P/N ALB24RED) to terminals (1) and (2) of terminal strip (figure 4-8) and observe HEATER gages (M2) and (M3) of test set.

3. If jump across terminals (1) and (2) does not cause (M2) and (M3) to go to zero, replace electronics box.

4. If jump across terminals (1) and (2) causes (M2) and (M3) to go to zero, perform the following:

    a. Check thermistor (RT1) wires for broken wire, defective terminal connection or other open circuit using Fluke 77/AN multimeter.

    b. Normal resistance of the thermistor (RT1) is 6000 to 16,000 ohms depending on temperature. If reading on multimeter is between 6000 to 16,000 ohms, locate and repair defective wires.

    c. Reassemble concentrator and continue Bench Test.

Table 4-3. Troubleshooting (Heater No. 1 (DS4) and Heater No. 2 (DS5) (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
Test set meter (DS4) and (DS5) are both on and do not cycle on to off.	Thermistor RT1 leads are open in circuit, electronics box has shorted output transistor or heater drive circuit.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Turn on 28 Vdc POWER supply and set CONC circuit breaker (CB1) test set POWER to ON position.

2. Attach test lead wire (P/N ALB24RED) to terminals (1) and (2) of terminal strip (figure 4-8) and observe HEATER gages (DS2) and (DS3) of test set.

3. If jump across terminals (1) and (2) does not cause (DS4) and (DS5) to go off, replace electronics box.

4. If jump across terminals (1) and (2) causes (DS4) and (DS5) to go off, perform the following:

   a. Check thermistor (RT1) wires for broken wire, defective terminal connection or other open circuit using Fluke 77/AN multimeter.

   b. Normal resistance of the thermistor (RT1) is 6000 to 16,000 ohms depending on temperature. If reading on multimeter is between 6000 to 16,000 ohms, locate and repair defective wires.

   c. Reassemble concentrator and continue Bench Test.

Table 4-4. Troubleshooting (Pressure Reducer (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
AIR-OXY PRESSURE gage (G1) indicates above 37 psig.	Pressure reducer set to high.	Replace pressure reducer.
AIR-OXY PRESSURE gage (G1) indicates below 30 psig.	Pressure reducer set to low.	Replace pressure reducer.
AIR-OXY PRESSURE gage (G1) indicates between 30 to 37 psig, but continues to creep slowly.	Pressure reducer leaking.	Replace pressure reducer.

Table 4-5. Troubleshooting (Pressure Reducer (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
OXY FROM CONC gage (G1) indicates above 37 psig.	Pressure reducer set to high.	Replace pressure reducer.
OXY FROM CONC gage (G1) indicates below 30 psig.	Pressure reducer set to low.	Replace pressure reducer.
OXY FROM CONC gage (G1) indicates between 30 to 37 psig, but continues to creep slowly.	Pressure reducer leaking.	Replace pressure reducer.

Table 4-6. Troubleshooting (Heater No. 1 (M2) and Heater No. 2 (M3) (Do Not Indicate 7 to 10 amps) (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
Test set meter (M2) and (M3) do not indicate 7 to 10 amps when 28 Vdc POWER is turned on.	Thermistor (RT1) is shorted, open circuits(s) in electronics box heater circuits/elements.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Turn on 28 Vdc POWER supply and observe test set meters (M2) and (M3).

2. If both meters (M2) and (M3) indicate 7 to 10 amps; visually inspect thermistor (RT1) lead for worn insulation or bare wires which could cause a short across terminals 1 and 2. If wires can be repaired; repair wires, reassemble concentrator and continue Bench Test. If wires cannot be repaired; change electronics box, reassemble concentrator and continue Bench Test.

3. If both meters (M2) and (M3) do not indicate 7 to 10 amps, the electronics box is defective or the heater elements are open, perform the following:

   a. Gain access to the two pairs of heater wires (two each have blue tracer color/two each have green tracer color) that contain crimp splices connecting them to the electronic box.

   b. Cut the two pairs of heater wires close to the splices and check the dc resistance.

   c. Using Fluke 77/AN multimeter, measure the resistance between the two blue tracer wires, then measure the resistance between the two green tracer wires. If measured resistance is not approximately 3 ohms, replace heater assembly. If measure resistance is approximately 3 ohms, replace electronics box assembly.

4. Reassemble concentrator and continue Bench Test.

Table 4-7. Troubleshooting (Heater No. 1 (DS4) and Heater No. 2 (DS5) (Lamps Do Not Illuminate) (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
Test set lamp (DS4) and (DS5) do not illuminate when 28 Vdc POWER is turned on.	Thermistor (RT1) is shorted, open circuit(s) in electronics box heater circuits/elements.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Turn on 28 Vdc POWER supply and observe test set lamps (DS4) and (DS5).

2. If both lamps (DS4) and (DS5) illuminate; visually inspect thermistor (RT1) lead for worn insulation or bare wires which could cause a short across terminals 1 and 2. If wires can be repaired; repair wires, reassemble concentrator and continue Bench Test. If wires cannot be repaired; change electronics box, reassemble concentrator and continue Bench Test.

3. If both lamps (DS4) and (DS5) do not illuminate, the electronics box is defective or the heater elements are open, perform the following:

   a. Gain access to the two pairs of heater wires (two each have blue tracer color/two each have green tracer color) that contain crimp splices connecting them to the electronic box.

   b. Cut the two pairs of heater wires close to the splices and check the dc resistance.

   c. Using Fluke 77/AN multimeter, measure the resistance between the two blue tracer wires, then measure the resistance between the two green tracer wires. If measured resistance is not approximately 3 ohms, replace heater assembly. If measured resistance is approximately 3 ohms, replace electronics box assembly.

4. Reassemble concentrator and continue Bench Test.

Table 4-8. Troubleshooting (Motor/Solenoid Meter (M1) (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
MOTOR/SOLENOID meter (M1) does not indicate 2.5 amps on initial turn on and then reduce to 1.8 after warm-up.	Shroud heater solenoid, temperature sensing thermistors, or electronics box has electrical failure. Temperature between molecular sieve beds is above 80°F.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Disable heater circuits by connecting test lead wire from terminal 1 to terminal 2 on terminal strip.

2. Turn on 28 Vdc POWER supply to concentrator.

3. Turn CONC circuit breaker switch (CB1) to ON position and verify that air heaters have been disabled by observing that meters (M2) and (M3) remain at zero.

4. Disconnect the thermistor (RT2) lead from terminal 3 of the terminal strip.

   a. If the current on meter (M1) increases, the thermistor (RT2) or lead wires are shorted. Find the short and repair wires (if possible), reassemble concentrator and continue bench.

   b. If the current on meter (M1) does not increase or the wires in step 4a above are not repairable, go to step 5.

5. Install test lead wire between terminals 2 and 3 on terminal strip.

6. Using Fluke 77/AN multimeter, measure Vdc between terminals 5 and 6 on terminal strip. Terminal 6 will be negative.

7. If terminal 5 reading is not +24 to +34 Vdc relative to terminal 6, go to step 8.

8. Measure Vdc between terminal 6 and terminal 4.

9. If terminal 4 is not +24 to +34 Vdc relative to terminal 6, perform the following:

   a. Check solenoid valve leads for broken wires or defective terminals by measuring solenoid coil resistance using Fluke 77/AN multimeter. If resistance reading is not between 80 to 100 ohms, repair or replace solenoid valve, reassemble concentrator, and continue to Bench Test.

   b. If terminal 4 is +24 to +34 Vdc relative to terminal 6, or if resistance reading in step 4a. above is 80 to 100 ohms, go to step 10 below.

10. Remove test lead wire from terminals 2 and 3 of terminal strip.

    a. Measure Vdc between terminal 6 (negative) and terminal 4 (positive). If the voltage decreases to less than +2 Vdc, reassemble concentrator and continue to Bench Test.

    b. If the voltage does not decrease to less than +2 Vdc, replace electronics box, reassemble concentrator, and continue to Bench Test.

Table 4-9. Troubleshooting (Motor/Solenoid Meter (M1) (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
28 V MOTOR meter (M1) does not indicate 2.5 amps on initial turn on and then reduce to 1.8 amps after warm-up.	Shroud heater solenoid, temperature sensing thermistors, or electronics box has electrical failure. Temperature between molecular sieve beds is above 80°F.	Isolate and repair by performing steps below.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

1. Disable heater circuits by connecting test lead wire from terminal 1 to terminal 2 on terminal strip.

2. Turn on 28 Vdc POWER supply to concentrator.

3. Turn 28 VDC ON circuit breaker switch (CB1) to ON position and verify that air heaters have been disabled by observing that lamps (DS4) and (DS5) remain off.

4. Disconnect the thermistor (RT2) lead from terminal 3 of the terminal strip.

   a. If the current on meter (M1) increases, the thermistor (RT2) or lead wires are shorted. Find the short and repair wires (if possible), reassemble concentrator and continue Bench Test.

   b. If the current on meter (M1) does not increase or the wires in step 4a above are not repairable, go to step 5.

5. Install test lead wire between terminals 2 and 3 on terminal strip.

6. Using Fluke 77/AN multimeter, measure Vdc between terminals 5 and 6 on terminal strip. Terminal 6 will be negative.

7. If terminal 5 reading is not +24 to +34 Vdc relative to terminal 6, go to step 8.

8. Measure Vdc between terminal 6 and terminal 4.

9. If terminal 4 is not +24 to +34 Vdc relative to terminal 6, perform the following:

   a. Check solenoid valve leads for broken wires or defective terminals by measuring solenoid coil resistance using Fluke 77/AN multimeter. If resistance reading is not between 80 to 100 ohms, repair or replace solenoid valve, reassemble concentrator, and continue to Bench Test.

   b. If terminal 4 is +24 to +34 Vdc relative to terminal 6, or if resistance reading in step 4a. above is 80 to 100 ohms, go to step 10 below.

10. Remove test lead wire from terminals 2 and 3 of terminal strip.

   a. Measure Vdc between terminal 6 (negative) and terminal 4 (positive). If the voltage decreases to less than +2 Vdc, reassemble concentrator and continue to Bench Test.

   b. If the voltage does not decrease to less than +2 Vdc, replace electronics box, reassemble concentrator, and continue to Bench Test.

Table 4-10. Troubleshooting (Heater No. 1 and Heater No. 2 (Meters M2 and M3) (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
Do not indicate 7 to 10 amps current on meters (M2) and (M3) and thermistor leads are not identified. To isolate trouble, identify thermistor leads, repair concentrator, perform the following steps:		
NOTE CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained. 1. Turn 28 Vdc POWER supply on. 2. Turn CONC circuit breaker (CB1) to ON position. 3. Set Fluke 77/AN multimeter to read 5000 to 20,000 ohms. 4. Connect Fluke 77/AN multimeter leads to terminals of a pair of thermistor leads and note resistance value. Then spray the thermistor with cleaning compound or a cool mist and note resistance valve when thermistor is cooled. a. If the resistance value reading increases when thermistor is cooled, tag leads 2 and 3 as shroud thermistor leads. b. If the resistance value reading does not increase when thermistor is cooled, repeat step 4 with the other pair of thermistor leads.		

Table 4-11. Troubleshooting (Heater No. 1 and Heater No. 2 (Lamps DS4 and DS5) (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
Lamps (DS4) and (DS5) remain off and thermistor leads are not identified. To isolate trouble, identify thermistor leads, repair concentrator, perform the following steps:		
NOTE CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained. 1. Turn 28 Vdc POWER supply on. 2. Turn 28 Vdc ON circuit breaker (CB1) to ON position. 3. Set Fluke 77/AN multimeter to read 5000 to 20,000 ohms. 4. Connect Fluke 77/AN multimeter leads to terminals of a pair of thermistor leads and note resistance value. Then spray the thermistor with cleaning compound or a cool mist and note resistance valve when thermistor is cooled. a. If the resistance value reading increases when thermistor is cooled, tag leads 2 and 3 as shroud thermistor leads. b. If the resistance value reading does not increase when thermistor is cooled, repeat step 4 with the other pair of thermistor leads.		

Table 4-12. Troubleshooting (Rotary Valve (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
Rotary valve does not operate, no pressure cycles (high to low flow) at output of concentrator.	Voltage problem to rotary valve assembly and motor or electronics box has an open circuit. Resistance or rotary valve and motor or electronics box is not within 200 ohms.	Isolate and repair by performing steps below.

WARNING

Disable heater circuit by connecting test lead wire from terminal 1 to terminal 2. Observe meters (M2) and (M3) and ensure they remain at zero.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

Due to the complexity of the troubleshooting procedures for the rotary valve assembly the following yes/no check sheet is provided. When performing test, if the answer is yes/no, go to step indicated in the yes/no column.

Procedures	Yes	No
1. Turn on 28 Vdc power to concentrator and measure ac voltage between terminals 7 and 9. Is voltage 20 to 35 Vac?	2	4
2. Measure and record ac voltage between terminals 7 and 8. Is voltage greater than 50 Vac?	3	7
3. AC voltage is normal. Turn off power to test set, disconnect leads and continue Bench Test.	—	—
NOTE Disconnect motor leads from terminals 7, 8, and 9 on terminal strip before continuing fault isolation.		
4. Measure resistance between red and brown motor leads. Is resistance 0.2 to 0.4 ohms?	5	12
5. Measure resistance between black and blue motor leads. Is resistance 3.0 to 3.2 ohms?	6	12

Table 4-12. Troubleshooting (Rotary Valve (Model TTU-452A/E Test Set)) (Cont)

Procedures	Yes	No
NOTE Brown and blue leads are connected together for the following step.		
6. Measure resistance between red and black motor leads. Is resistance 3.2 to 3.6 ohms or the sum of measurements from steps 4 and 5?	7	12
7. Measure dc resistance between terminals 8 and 9 on test terminal strip on electronics box assembly to determine if capacitor C9 is shorted. Is resistance greater than 200 K ohms?	8	13
8. Measure dc resistance between terminals 7 and 8 on test terminal strip on electronics box assembly to determine if power transistor is shorted or leaking.	—	—
9. Measure dc resistance between terminals 7 and 9 on test terminal strip on electronics box assembly to determine if power transistor is shorted or leaking.	—	—
a. Record resistance.	—	—
b. Turn on 28 Vdc to concentrator.	—	—
c. Is resistance greater than 200 K ohms with either polarity?	10	13
10. Do the following substeps to test electronic box assembly:	—	—
a. Connect power cable from concentrator to the test set.	—	—
b. Turn on 28 Vdc to concentrator.	—	—
c. Measure ac voltage between terminals 7 to 9 to test oscillator and power output stages.		
d. Is ac voltage 20 to 30 Vac?	11	13
11. Do the following substeps to test continuity of capacitor C9:	—	—
a. Measure ac voltage between terminals 7 and 8.	—	—
b. Is AC voltage 20 to 30 Vac?	12	13
12. Repair wires or replace rotary valve assembly. Continue Bench Test.	—	—
13. Replace electronics box assembly and both thermistor probe leads. Continue Bench Test.	—	—

Table 4-13. Troubleshooting (Rotary Valve (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
Rotary valve does not operate, no pressure cycles (high to low flow) at output of concentrator.	Voltage problem to rotary valve assembly and motor or electronics box has an open circuit. Resistance or rotary valve and motor or electronics box is not within 200 ohms.	Isolate and repair by performing steps below.

WARNING

Disable heater circuit by connecting test lead wire from terminal 1 to terminal 2. Observe lamps (DS4) and (DS5) and ensure they remain at zero.

NOTE

CONC ON/OFF switch (S1) must be in ON position in order to take readings. Place S1 in OFF position after readings are obtained.

Due to the complexity of the troubleshooting procedures for the rotary valve assembly, the following yes/no check sheet is provided. When performing test, if the answer is yes/no, go to step indicated in the yes/no column.

Procedures	Yes	No
1. Turn on 28 Vdc power to concentrator and measure ac voltage between terminals 7 and 9. Is voltage 20 to 35 Vac?	2	4
2. Measure and record ac voltage between terminals 7 and 8. Is voltage greater than 50 Vac?	3	7
3. AC voltage is normal. Turn off power to test set, disconnect leads and continue Bench Test.	—	—
NOTE Disconnect motor leads from terminals 7, 8, and 9 on terminal strip before continuing fault isolation.		
4. Measure resistance between red and brown motor leads. Is resistance 0.2 to 0.4 ohms?	5	12
5. Measure resistance between black and blue motor leads. Is resistance 3.0 to 3.2 ohms?	6	12

Table 4-13. Troubleshooting (Rotary Valve (Model TTU-518A/E Test Set)) (Cont)

Procedures	Yes	No
NOTE Brown and blue leads are connected together for the following step.		
6. Measure resistance between red and black motor leads. Is resistance 3.2 to 3.6 ohms or the sum of measurements from steps 4 and 5?	7	12
7. Measure dc resistance between terminals 8 and 9 on test terminal strip on electronics box assembly to determine if capacitor C9 is shorted. Is resistance greater than 200 K ohms?	8	13
8. Measure dc resistance between terminals 7 and 9 on test terminal strip on electronics box assembly to determine if power transistor is shorted or leaking.	—	—
9. Measure dc resistance between terminals 7 and 9 on test terminal strip on electronics box assembly to determine if power transistor is shorted or leaking.	—	—
a. Record resistance.	—	—
b. Reverse ohmmeter leads and take second reading.	—	—
c. Is resistance greater than 200 K ohms with either polarity?	10	13
10. Do the following substeps to test electronic box assembly:	—	—
a. Connect power cable from concentrator to the test set.	—	—
b. Turn on 28 Vdc to concentrator.	—	—
c. Measure ac voltage between terminals 7 to 9 to test oscillator and power output stages.		
d. Is ac voltage 20 to 30 Vac?	11	13
11. Do the following substeps to test continuity of capacitor C9.	—	—
a. Measure ac voltage between terminals 7 and 8.	—	—
b. Is AC voltage 20 to 30 Vac?	12	13
12. Repair wires or replace rotary valve assembly. Continue Bench Test.	—	—
13. Replace electronics box assembly and both thermistor probe leads. Continue Bench Test.	—	—

Table 4-14. Troubleshooting (Internal/External Leakage (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
Internal/external leakage exceed 3 psig per minute or 15 psig in 5 minutes.	Foreign material, dirt, loose screws, defective performed packing etc. Check valve assemblies defective.	Isolate and repair by performing steps below.

NOTE

Ensure all test set hose assemblies from test set to concentrator are properly attached and not leaking.

1. Using leak detection compound, inspect concentrator for external leakage as indicated by bubbles.

   a. If external leak is detected, visually inspect for foreign matter, defective component parts or other obvious damage; clean, repair, or replace component parts as necessary and continue Bench Test.

   b. If no external leak is detected and check valve assemblies were not replaced in step 1a; remove and replace check valve assemblies and continue Bench Test.

Table 4-15. Troubleshooting (Internal/External Leakage (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
Internal/external leakage exceed 3 psig per minute or 15 psig in 5 minutes.	Foreign material, dirt, loose screws, defective performed packing etc. Check valve assemblies defective.	Isolate and repair by performing steps below.

NOTE

Ensure all test set hose assemblies from test set to concentrator are properly attached and not leaking.

1. Using leak detection compound, inspect concentrator for external leakage as indicated by bubbles.

   a. If external leak is detected, visually inspect for foreign matter, defective component parts or other obvious damage; clean, repair, or replace component parts as necessary and continue Bench Test.

   b. If no external leak is detected and check valve assemblies were not replaced in step 1a; remove and replace check valve assemblies and continue Bench Test.

Table 4-16. Troubleshooting (Oxygen Flow Test (Model TTU-452A/E Test Set))

Trouble	Probable Cause	Remedy
	NOTE When Troubleshooting Oxygen Flow Test only, perform one probable cause and remedy at a time, then return to Bench Test to see if concentrator passes Oxygen Flow Test.	
Concentrator does not produce minimum required oxygen % during flow test or AIR-OXY PRESSURE gage (G1) readings do not fall within minimum and maximum allowable tolerances.	Oxygen monitor of test set not set properly or needs replacing.	Test monitor on test set or replace as required.
	Filter tube element dirty and clogged.	Replace filter tube element.
	Sieve beds contaminated.	Replace sieve beds.

Table 4-17. Troubleshooting (Oxygen Flow Test (Model TTU-518A/E Test Set))

Trouble	Probable Cause	Remedy
	NOTE When Troubleshooting Oxygen Flow Test only, perform one probable cause and remedy at a time, then return to Bench Test to see if concentrator passes Oxygen Flow Test.	
Concentrator does not produce minimum required oxygen % during flow test or AIR-OXY PRESSURE gage (G1) readings do not fall within minimum and maximum allowable tolerances.	Oxygen sensor of test set not set properly or needs replacing.	Reset sensor gain on test set or replace oxygen sensor.
	Filter tube element dirty and clogged.	Replace filter tube element.
	Sieve beds contaminated.	Replace sieve beds.

4-64. DISASSEMBLY.

4-65. Disassemble the OEAS oxygen concentrator using index numbers assigned to the figure referred to unless otherwise noted. Disassemble the OEAS oxygen concentrator only as far as required to correct any malfunction. Some components can be removed from the concentrator without first removing the mounting plate (3, figure 4-12) and stabilizer plate (2, figure 4-13).

CAUTION

All disassembly, inspection, repair, and assembly must be done on clean benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor, and ceiling should have a smooth finish and be painted with non-chalking paint which can be kept clean and dust free.

NOTE

It is desirable to keep all parts for each individual component separated. Make careful note of the location and quantity of all parts. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

4-66. SHROUD ASSEMBLY REMOVAL. To remove the Shroud Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealing	—
As Required	Tape, Pressure Sensitive	PPP-T-42

Support Equipment Required

Quantity	Description	Reference Number
1	Board, Peg	Fabricate IAW figure 4-9
9	Bolts, Cut-off	AN-5-24 NIIN 00-151-0917 Fabricate IAW figure 4-10
1	Heater, Gun Type	MIL-H-45193C (CAGE 891349) NIIN 00-561-1002

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 4-11 unless otherwise noted.

1. Loosen nut (1) on diffuser tube (2) and disconnect tube (2) from solenoid valve (3). Tape nut (1) to top of tube (2) with pressure sensitive tape.

2. Remove screw (4), lockwasher (5) and flat washers (6) and (7) that secure outlet fitting (8) to mounting plate (9).

CAUTION

Use care when removing potting compound from electrical connector bracket so as not to damage wiring.

3. Remove four screws (10) and lockwashers (11) securing receptacle connector (12) to electrical connector bracket (13) and remove receptacle connector (12) from electrical connector bracket (13) by carefully removing potting compound.

4. Remove electrical connector bracket (13) from mounting plate (16) by removing two screws (14) and lockwashers (15).

5. Turn concentrator over so that mounting plate (16) is on top.

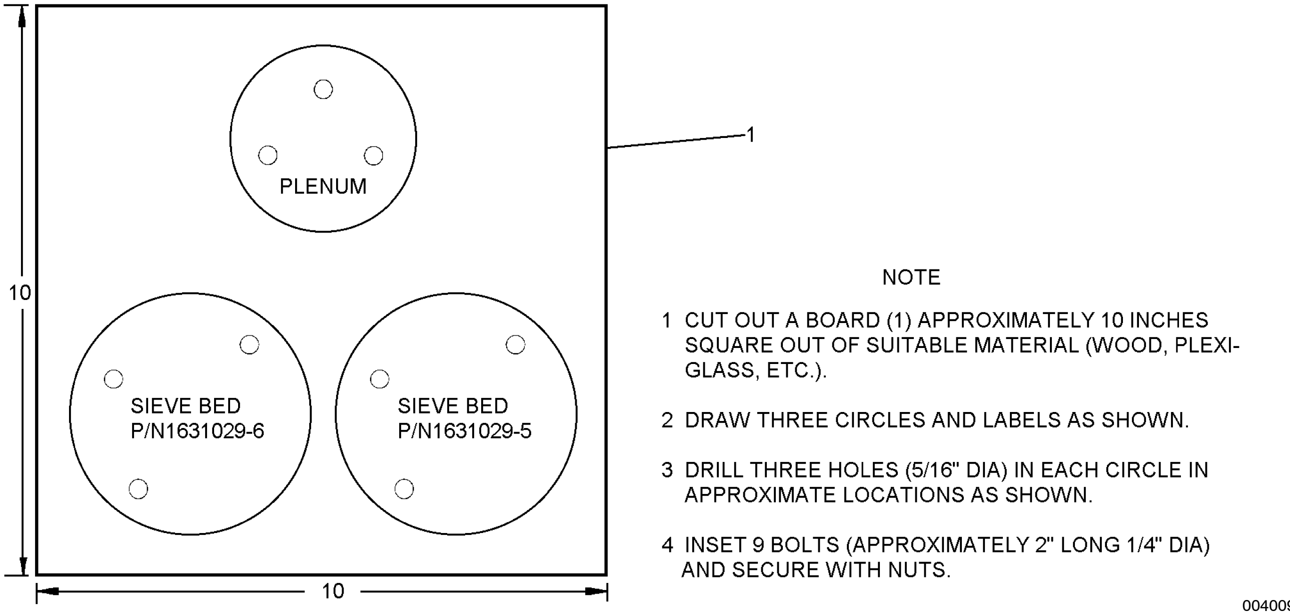


Figure 4-9. Peg Board for Plenum and Sieve Bed Spacers

WARNING

When performing steps 6 through 10, it will be necessary to heat screws to facilitate easy removal. The heat gun can generate extreme heat that can cause severe burns.

CAUTION

Use correct size screwdrivers, wrench and other tools to prevent damage to screws, nuts and etc.

NOTE

Index numbers refer to figure 4-12 unless otherwise noted.

6. Remove three screws (1) and lockwashers (2) securing mounting plate (3) to rotary valve assembly (4).

7. Remove two screws (5), two screws (6) with spacers (19), and two screws (7) with spacers (20) securing mounting plate (3) to electronics box assembly (8). Remove two screws (34) from electronics box assembly (8).

NOTE

When performing step 8, remove one screw at a time and install cut-off bolt (figure 4-10) in the screw hole from which the screw was removed. This procedure will prevent height adjustment washers from moving out of position.

8. Remove nine screws (9) from mounting plate (3) and install nine cut-off bolts (figure 4-10) in their place.

9. Remove two screws (10) securing mounting plate (3) to inlet filter assembly (11).

10. Remove two screws (12) securing mounting plate (3) to air heater assembly (13).

NOTE

Nut plate (14) and two cushion straps (15) have been secured to base of air heater assembly (13) with sealing compound. Do not remove unless replacing air heater assembly.

When performing step 11, ensure height adjustment washers do not move.

11. Carefully lift mounting plate (3) with attached shroud assembly (31); then remove outlet fitting (33), mounting plate (3), and shroud assembly (31) from concentrator.

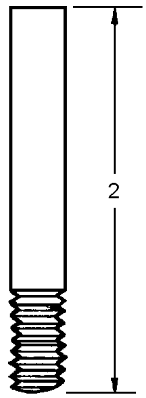


Figure 4-10. Cut-off Bolt for Disassembly and Assembly

NOTE

When performing step 12, place height adjustment washers on peg board (figure 4-9) in the same location on peg board as removed from two sieve beds and plenum assembly. During assembly, the height adjustment washers must be replaced in the same location.

12. Remove height adjustment washer (16) from top of two sieve beds (17) and plenum assembly (18) and place on peg board (figure 4-9) in same position as removed from sieve beds and plenum assembly.

13. Remove nine cut-off bolts (figure 4-10) from two sieve beds (17) and plenum assembly (18).

NOTE

Straps (24) and (26) and cushion straps (25) have been secured to electrical mount offset (23) with sealing compound. Do not remove unless replacement is necessary.

14. Remove electrical mount offset (23) from electronics box assembly (8) by removing two screws (21) and lockwashers (22).

15. Remove screws (27), lockwashers (28), and clamps (29) securing diffuser tube (30) to mounting plate (3).

16. Remove shroud assembly (31) from mounting plate (3).

17. Remove insulation blanket (32) from shroud assembly (31).

18. If replacement of shroud assembly (31) is necessary, remove identification plate from front of shroud assembly (31).

4-67. STABILIZER PLATE REMOVAL. To remove the Stabilizer Plate, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002

NOTE

Index numbers refer to figure 4-13 unless otherwise noted.

1. Place concentrator on work bench with stabilizer plate (2) facing up.

WARNING

When removing screws from stabilizer plate, it may be necessary to heat screws to facilitate easy removal. The heat gun can generate extreme heat that can cause severe burns.

2. Remove four screw (1) securing sieve beds (20) to stabilizer plate (2).

3. Remove two screws (1) securing spacer (7) and inlet filter assembly (8) to stabilizer plate (2).

4. Remove two screws (15) securing two spacers (14) and rotary valve assembly (13) to stabilizer plate (2).

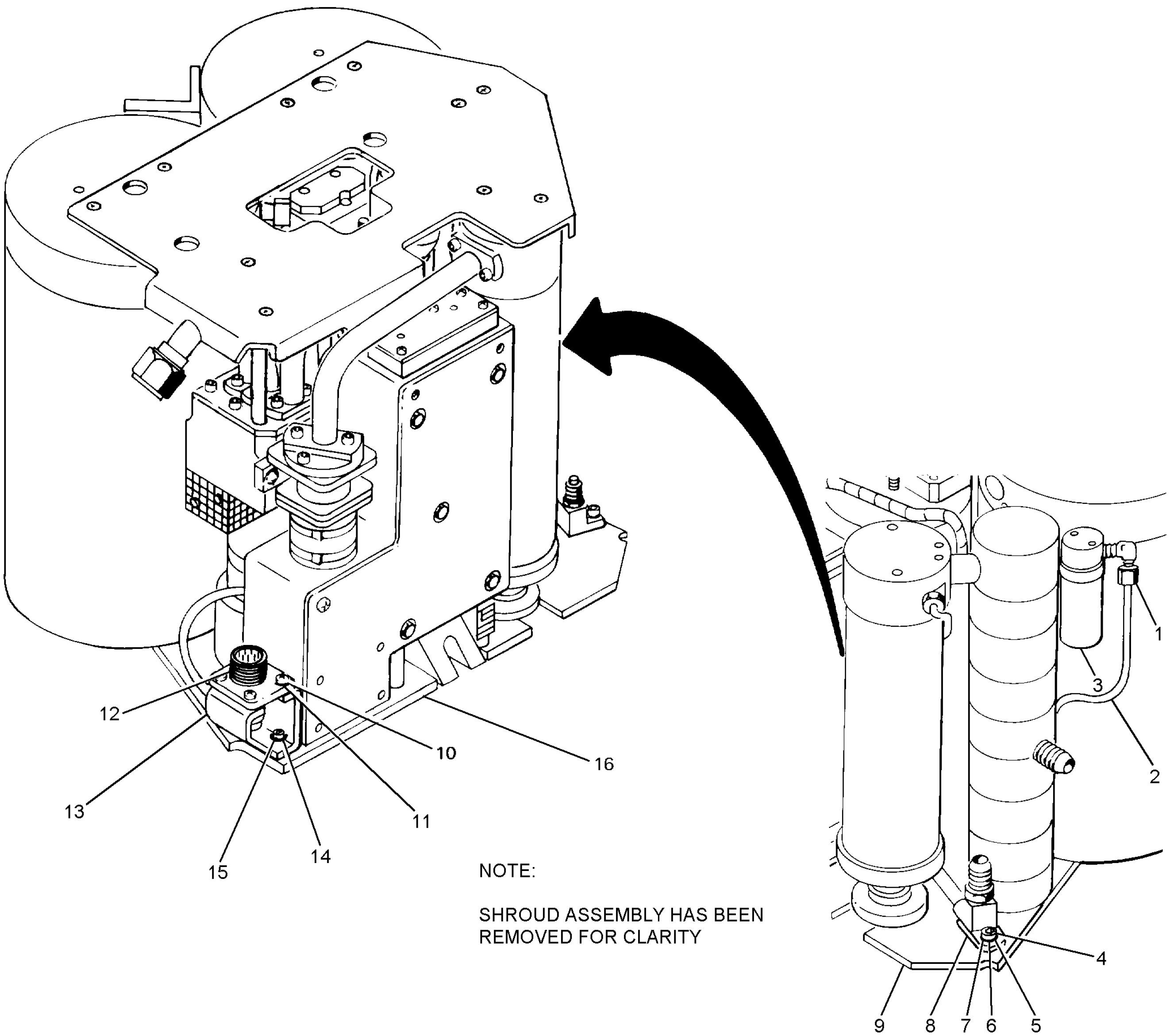
5. Remove self-locking nut (16) and flat washer (17) securing stabilizer plate to plenum assembly (21).

CAUTION

Use extreme care not to damage wiring leads to electronics box assembly.

6. Remove two screws (9) securing stabilizer plate (2) to electronics box assembly (12). Turn concentrator over slightly to allow two lockwashers (10) and flat washers (11) to fall out.

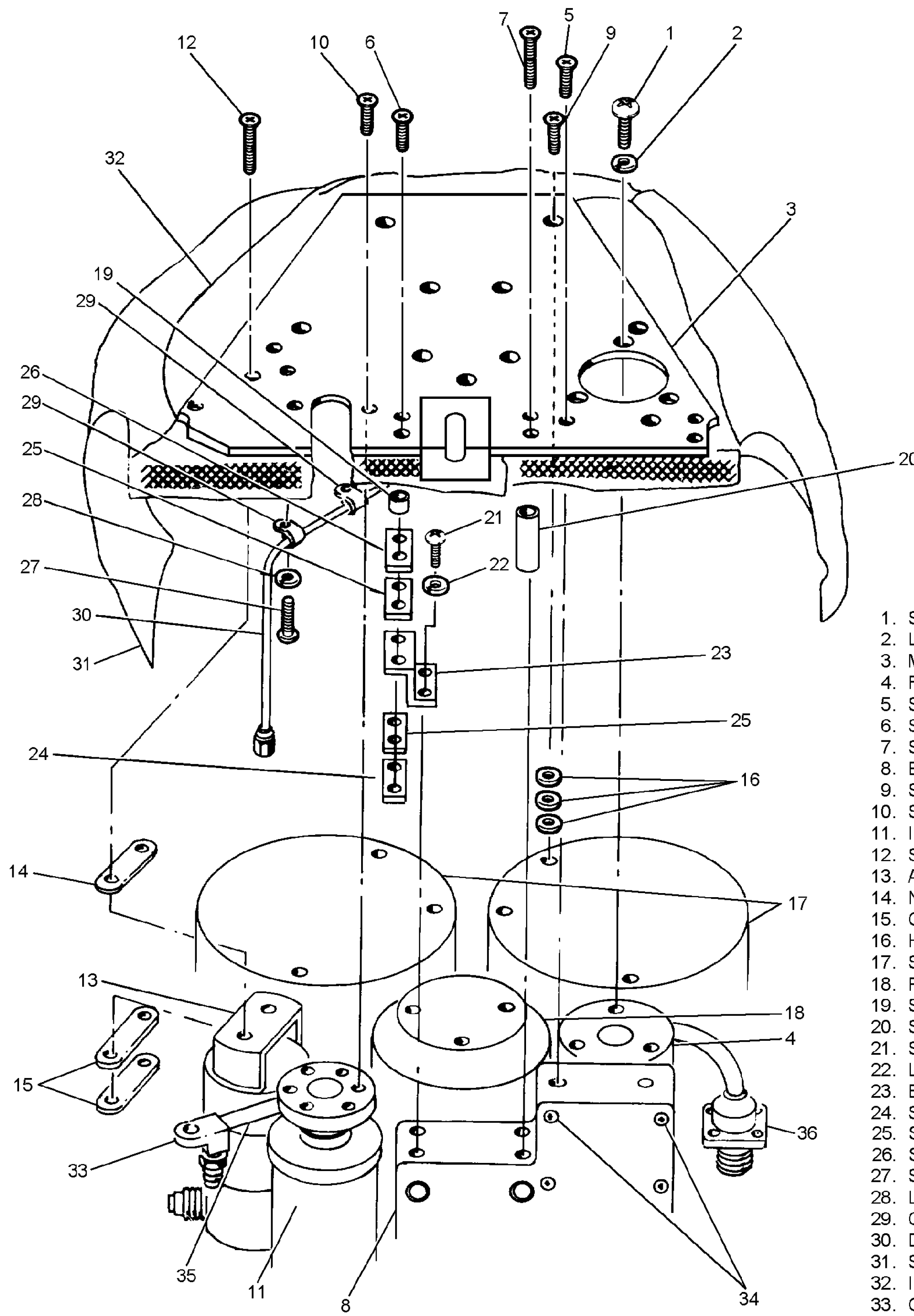
7. Remove two screws (3) securing stabilizer plate (2) to solenoid valve (5).



1. NUT	9. MOUNTING PLATE
2. DIFFUSER TUBE	10. SCREWS
3. SOLENOID VALVE	11. LOCKWASHERS
4. SCREW	12. RECEPTACLE CONNECTOR
5. LOCKWASHER	13. CONNECTOR BRACKET
6. WASHER	14. SCREWS
7. WASHER	15. LOCKWASHERS
8. OUTLET FITTING	16. MOUNTING PLATE

004011

Figure 4-11. Shroud Assembly Removal/Assembly



1. SCREW
2. LOCKWASHER
3. MOUNTING PLATE
4. ROTARY VALVE ASSEMBLY
5. SCREWS
6. SCREWS
7. SCREWS
8. ELECTRONICS BOX ASSEMBLY
9. SCREWS
10. SCREWS
11. INLET FILTER ASSEMBLY
12. SCREWS
13. AIR HEATER ASSEMBLY
14. NUT PLATE
15. CUSHION STRAPS
16. HEIGHT ADJUSTMENT WASHER
17. SIEVE BEDS
18. PLENUM ASSEMBLY
19. SPACERS
20. SPACERS
21. SCREW
22. LOCKWASHER
23. ELECTRICAL MOUNT OFFSET
24. STRAP
25. STRAP
26. STRAP
27. SCREWS
28. LOCKWASHERS
29. CLAMPS
30. DIFFUSER TUBE
31. SHROUD ASSEMBLY
32. INSULATION BLANKET
33. OUTLET FITTING ADAPTER
34. SCREWS
35. STRAIGHT ADAPTER
36. ELECTRICAL CONNECTOR

004012

Figure 4-12. Shroud Assembly/Mounting Plate Removal/Assembly

8. Remove stabilizer plate (2) from concentrator components.

9. Remove two spacers (4) from top of solenoid valve (5) and if necessary remove flat washer shims (6).

10. Remove spacer (7) from top of inlet filter assembly (8).

11. Remove two spacers (14) from top of rotary valve assembly (13).

12. Remove tube clamp (19) from plenum assembly (21).

13. Remove thread seal washer (18) from plenum assembly (21).

4-68. PRESSURE REDUCER ASSEMBLY REMOVAL. To remove the Pressure Reducer Assembly, proceed as follows:

NOTE

Index numbers refer to figure 4-14 unless otherwise noted.

1. Remove two panhead screws (1) and lockwashers (2) securing pressure reducer assembly (3) to inlet filter assembly (4).

2. Carefully cut and remove two tiedown straps (5).

3. Remove panhead screw (6), screw (8), and two lockwashers (7) securing pressure reducer (3) to rotary valve (10).

4. Remove pressure reducer assembly (3) from concentrator components.

5. Remove and discard preformed packing (9) from rotary valve assembly (10).

6. Remove and discard preformed packing (11) from inlet filter assembly (4).

4-69. ROTARY VALVE ASSEMBLY REMOVAL. To remove the Rotary Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Pressure Sensitive	PPP-T-42

NOTE

Index numbers refer to figure 4-15 unless otherwise noted.

1. Carefully cut and remove two tiedown straps (1) from wire bundles.

CAUTION

Cover (3) is secured with adhesive and may be difficult to remove. Use extreme care when removing cover (3) from terminal strip (4).

2. Remove five screws (2) and carefully remove cover (3) from terminal strip (4).

CAUTION

Use extreme care when removing RTV adhesive from terminal strip (4) to prevent cutting wires.

3. Carefully remove RTV adhesive from terminal strip (4).

4. Remove three screws (5) and remove lead wires from terminals 7, 8, and 9 of terminal strip (4). Cut all tiedown straps securing wire bundles.

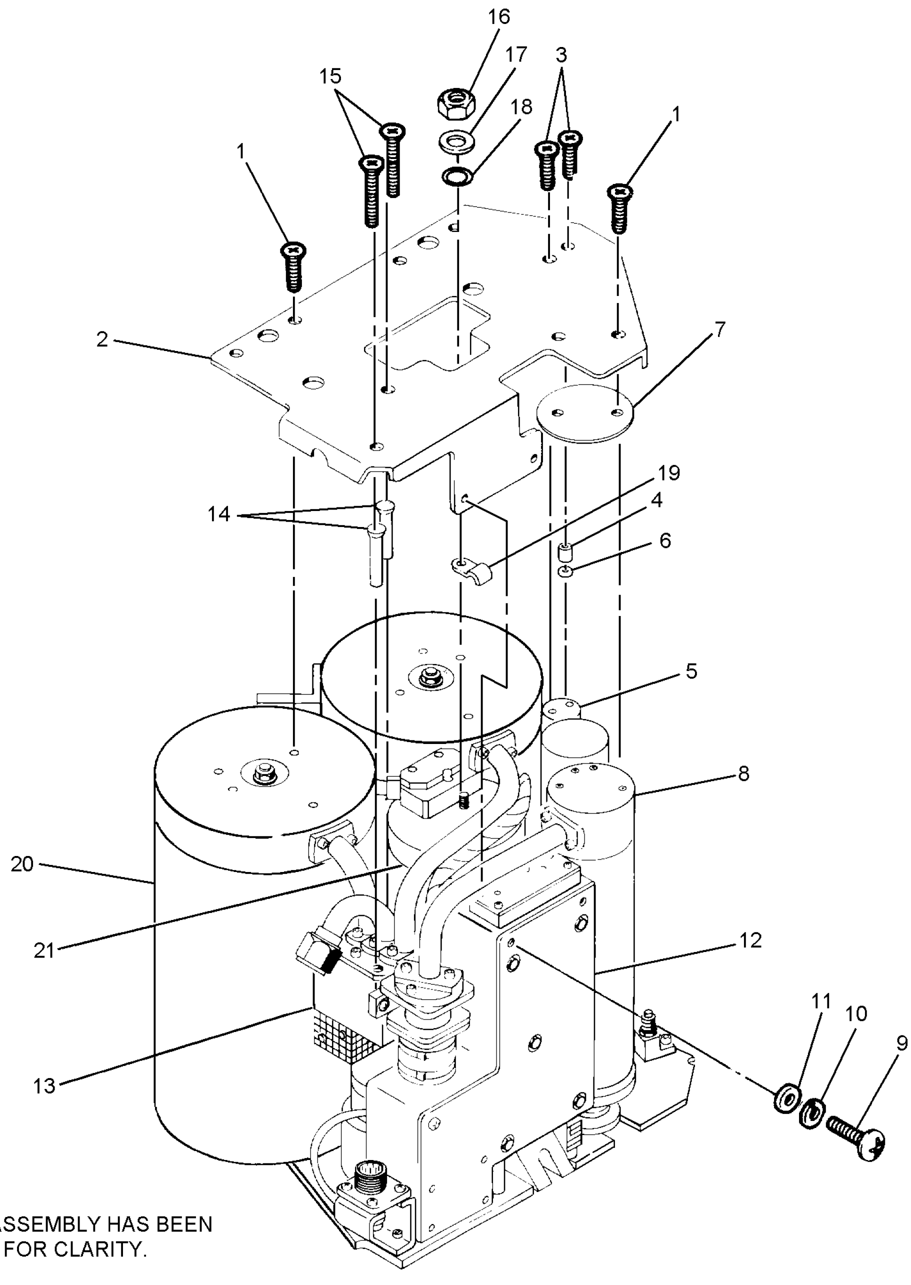
5. Remove four screws (6) and lockwashers (7) securing tube flanges (12) to sieve beds (8).

6. Remove rotary valve assembly (9) from concentrator component parts.

7. Remove and discard two preformed packings (10) (not shown) from two sieve bed (8) ports from which two rotary valve assembly (9) tube flanges (12) were removed.

8. Using pressure sensitive tape, tape two sieve bed (8) ports from which rotary valve assembly (9) tube flanges (12) were removed to prevent contaminants from entering sieve beds.

9. Remove vent tube (11) from rotary valve assembly (9) by removing two panhead screws and lock washers (not shown). Remove vent tube (11) and preformed packing (not shown) from rotary valve assembly (9).



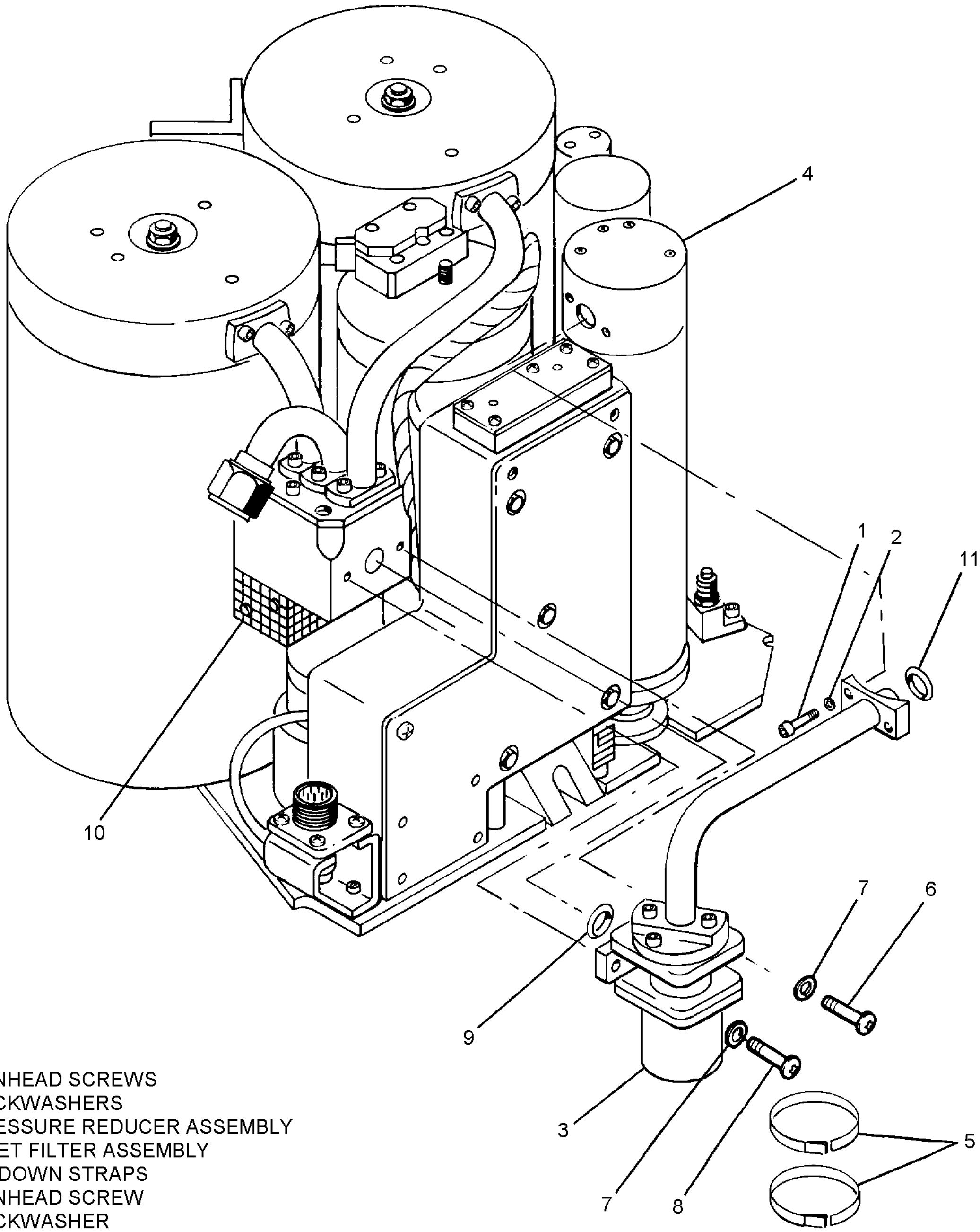
NOTE:

SHROUD ASSEMBLY HAS BEEN REMOVED FOR CLARITY.

1. SCREWS
2. STABILIZER PLATE
3. SCREWS
4. SPACERS
5. SOLENOID VALVE
6. FLAT WASHER SHIMS
7. SPACER
8. INLET FILTER ASSEMBLY
9. SCREWS
10. LOCKWASHERS
11. FLATWASHERS
12. ELECTRONIC BOX ASSEMBLY
13. ROTARY VALVE ASSEMBLY
14. SPACERS
15. SCREWS
16. SELF-LOCKING NUT
17. FLAT WASHER
18. THREAD SEAL WASHER
19. TUBE CLAMP
20. SIEVE BEDS
21. PLENUM ASSEMBLY

004013

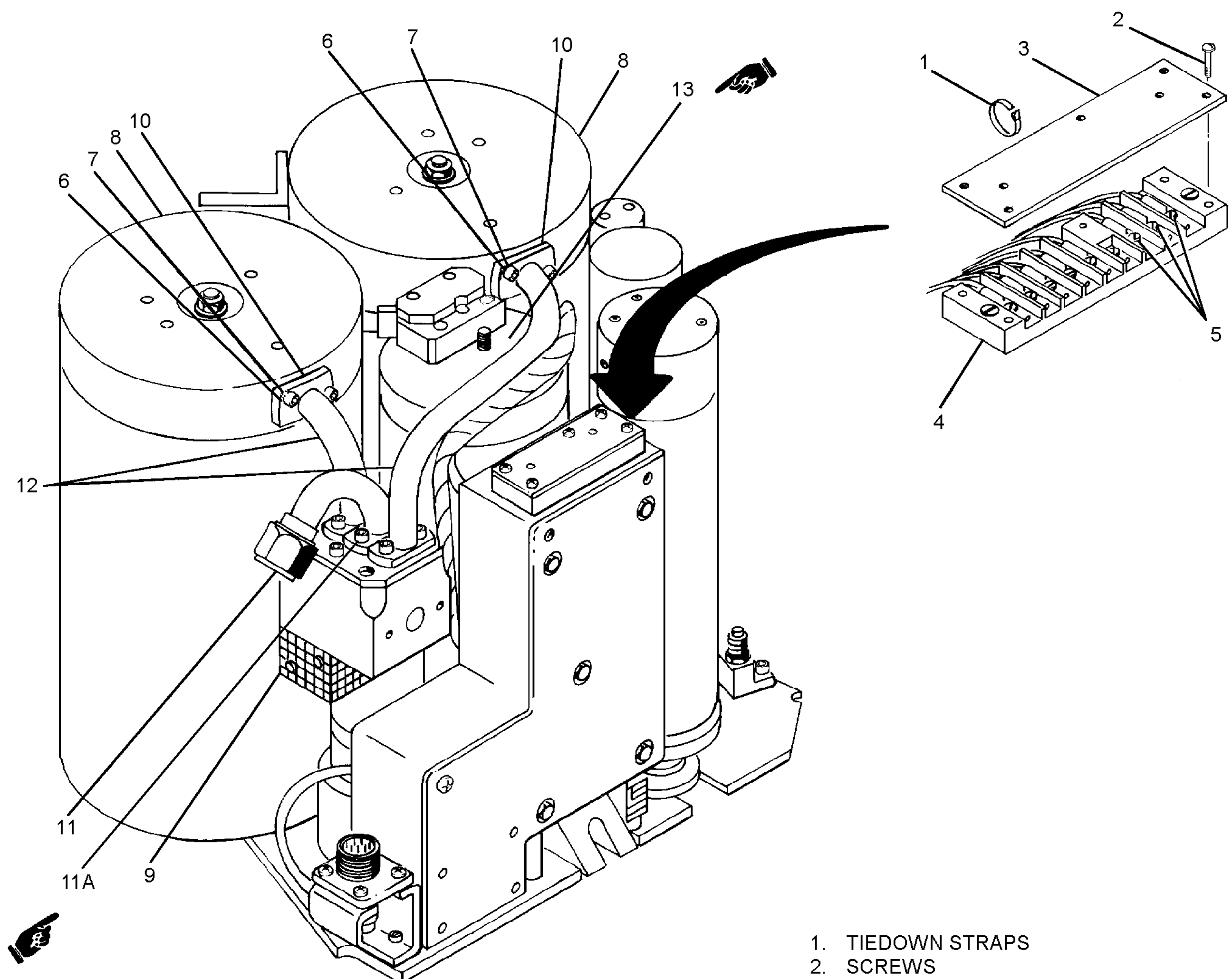
Figure 4-13. Stabilizer Plate Removal/Assembly



1. PANHEAD SCREWS
2. LOCKWASHERS
3. PRESSURE REDUCER ASSEMBLY
4. INLET FILTER ASSEMBLY
5. TIEDOWN STRAPS
6. PANHEAD SCREW
7. LOCKWASHER
8. SCREW
9. PREFORMED PACKING
10. ROTARY VALVE
11. PREFORMED PACKING

004014

Figure 4-14. Pressure Reducer Assembly Removal/Assembly



1. TIEDOWN STRAPS
2. SCREWS
3. COVER
4. TERMINAL STRIP
5. SCREWS
6. SCREWS
7. LOCKWASHERS
8. SIEVE BED
9. ROTARY VALVE ASSEMBLY
10. PREFORMED PACKINGS
11. VENT TUBE
11A. MOUNTING SCREWS
12. TUBE FLANGES
13. PLENUM ASSEMBLY

004015

Figure 4-15. Rotary Valve Assembly Removal/Assembly

4-70. SOLENOID VALVE ASSEMBLY REMOVAL. To remove the Solenoid Valve Assembly, proceed as follows:

NOTE

Index numbers refer to figure 4-16 unless otherwise noted.

1. Ensure concentrator components are in upright position.

2. Remove five screws (5) to release leads from terminals 1, 2, 3, 4, and 5 of the terminal strip.

3. Remove two screw pins (9) securing inlet filter assembly (10) to air heater assembly (11) and separate the heater (11) and inlet filter assembly (10).

4. Remove and discard preformed packing (12) from air heater assembly (11).

5. Remove fitting and orifice assembly (13) from solenoid valve assembly (8).

6. Remove solenoid valve assembly (8) from air heater assembly (11) at fitting (14).

4-71. AIR HEATER REMOVAL. To remove the Air Heater Assembly, proceed as follows:

NOTE

Do not cut wires connecting air heater assembly and electronics box assembly unless replacement of either component is necessary.

Index numbers refer to figure 4-17 unless otherwise noted.

1. Lay air heater assembly (1) in a position to gain access to wires.

NOTE

If replacing air heater assembly with a new unit, remove nut plate (3) and cushion straps (4).

Tag any wire which does not have a corresponding color tracer.

2. Identify four wires from electronics box assembly and four wires from air heater assembly which have been crimped together with connectors (5). Tag all wires which do not have a corresponding color tracer.

3. Remove heat shrink tubing from around wire bundles and from each individual wire.

4. Remove teflon tape from four connectors (5).

5. Cut connectors (5) out of wires as shown in figure 4-17, leaving wire ends exposed.

6. Remove and discard preformed packing (not shown) from top of air heater that fits into inlet filter assembly.

4-72. INLET FILTER ASSEMBLY REMOVAL. To remove the Inlet Filter Assembly, proceed as follows:

NOTE

Index numbers refer to figure 4-18 unless otherwise noted.

1. Ensure inlet filter assembly (3) is in upright position.

CAUTION

Do not remove or damage thermistors when removing inlet filter assembly.

2. Rotate filter mount nut (4) approximately 3 turns to release tension on inlet filter assembly (3).

3. If not previously removed, remove two lead wires from terminals 1 and 2 on terminal strip (1) coming from inlet filter assembly (3).

4. Remove and discard preformed packing (7) from filter inlet housing (6).

5. Remove filter tube element (5) by performing the following:

CAUTION

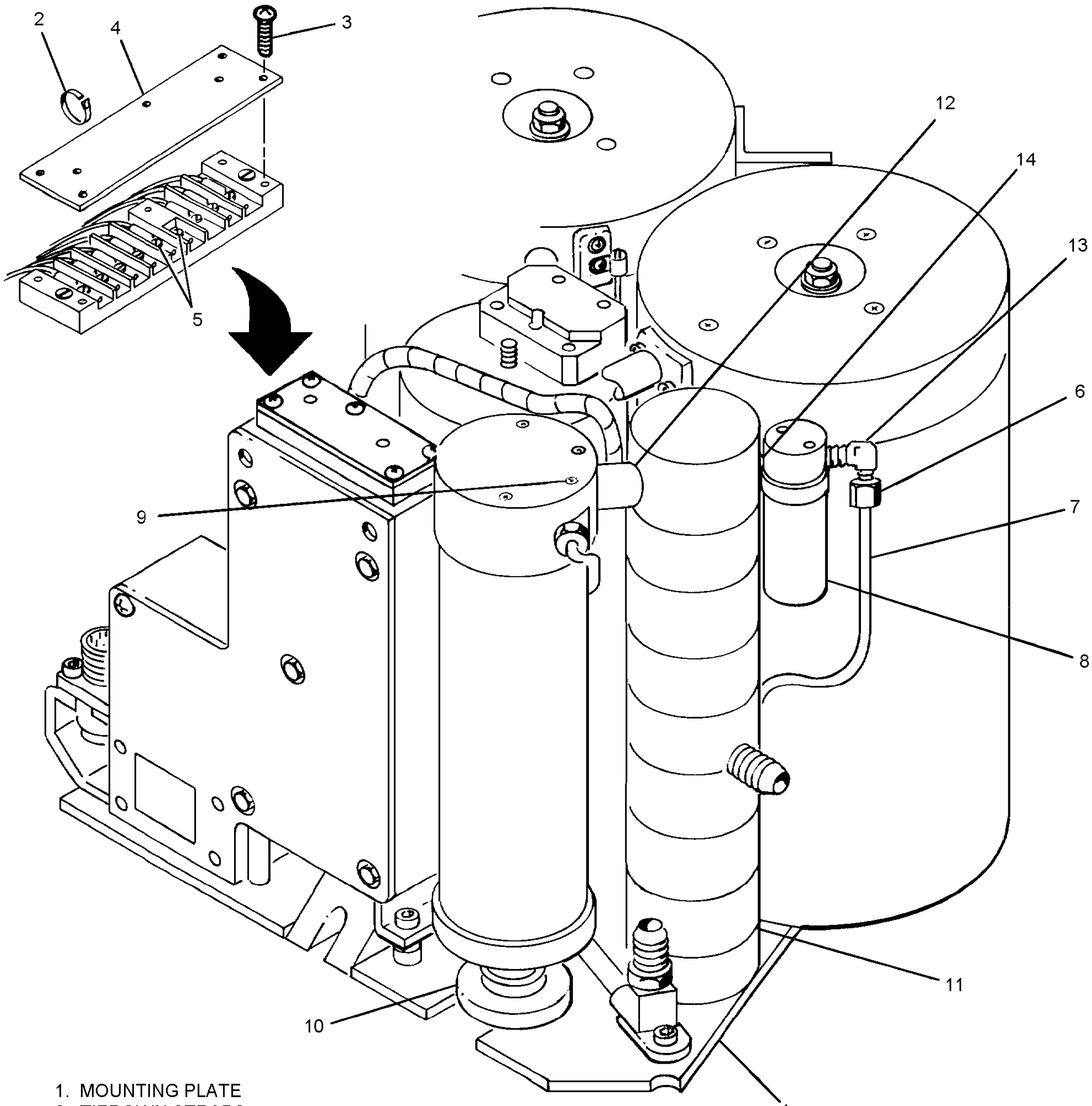
Do not scratch or gouge metal sealing surfaces.

a. Remove inlet filter sleeve (9) from filter inlet housing (6) by unscrewing filter mount screw nut (13).

b. If replacement of filter mount nut (4) is necessary, unscrew nut (4) from filter mount screw nut (13).

c. Remove inlet filter sleeve (9) from filter post screw (8) with attached parts.

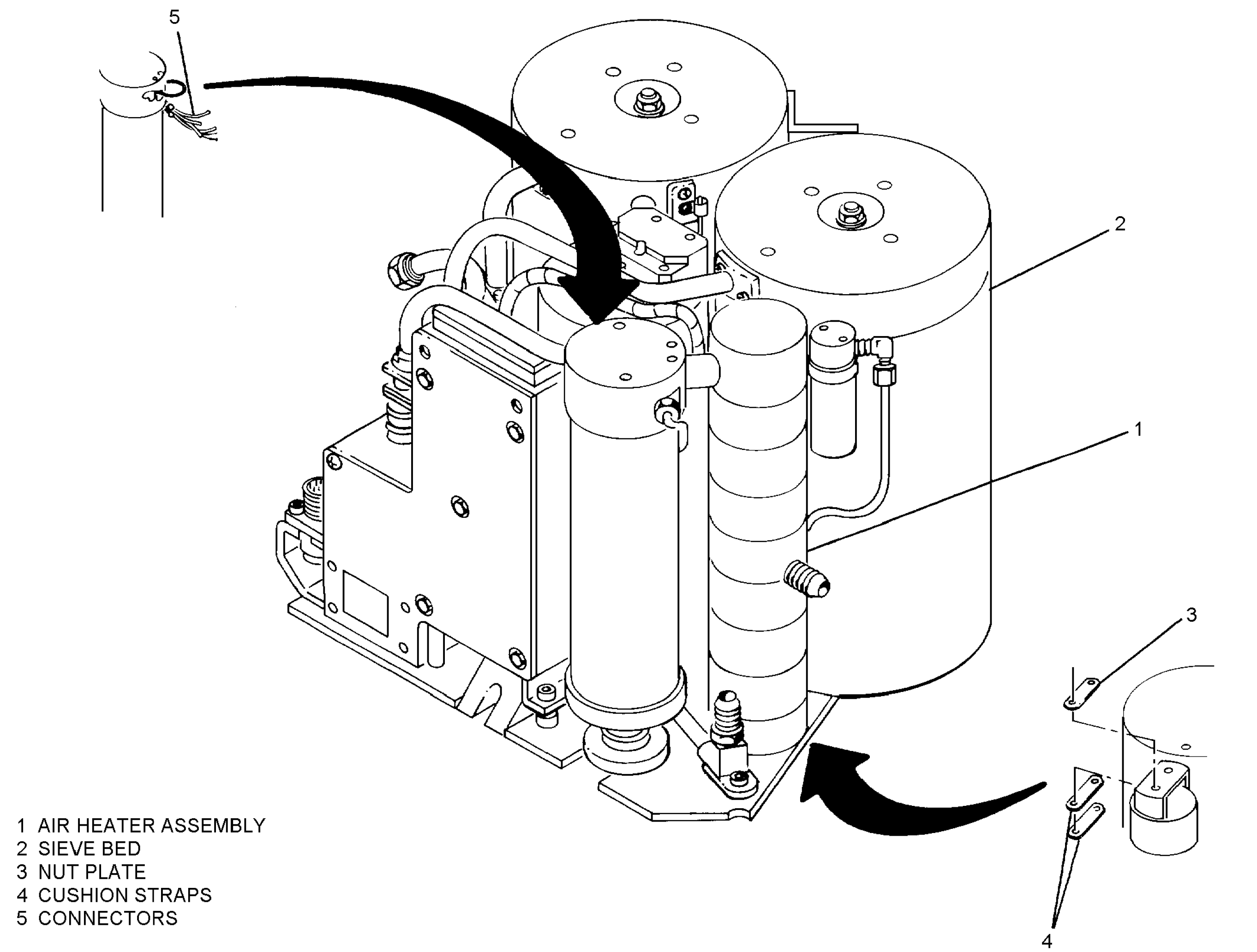
d. Remove water trap (4A), seal (4B), and filter tube element (5) from inlet filter sleeve (9).



1. MOUNTING PLATE
2. TIEDOWN STRAPS
3. SCREW
4. TERMINAL STRIP COVER
5. SCREWS
6. NUT
7. DIFFUSER TUBE
8. SOLENOID VALVE ASSEMBLY
9. SCREW PINS
10. INLET FILTER ASSEMBLY
11. AIR HEATER ASSEMBLY
12. PREFORMED PACKING
13. ORIFICE ASSEMBLY
14. FITTING

004016

Figure 4-16. Solenoid Valve Assemblies Removal/Assembly



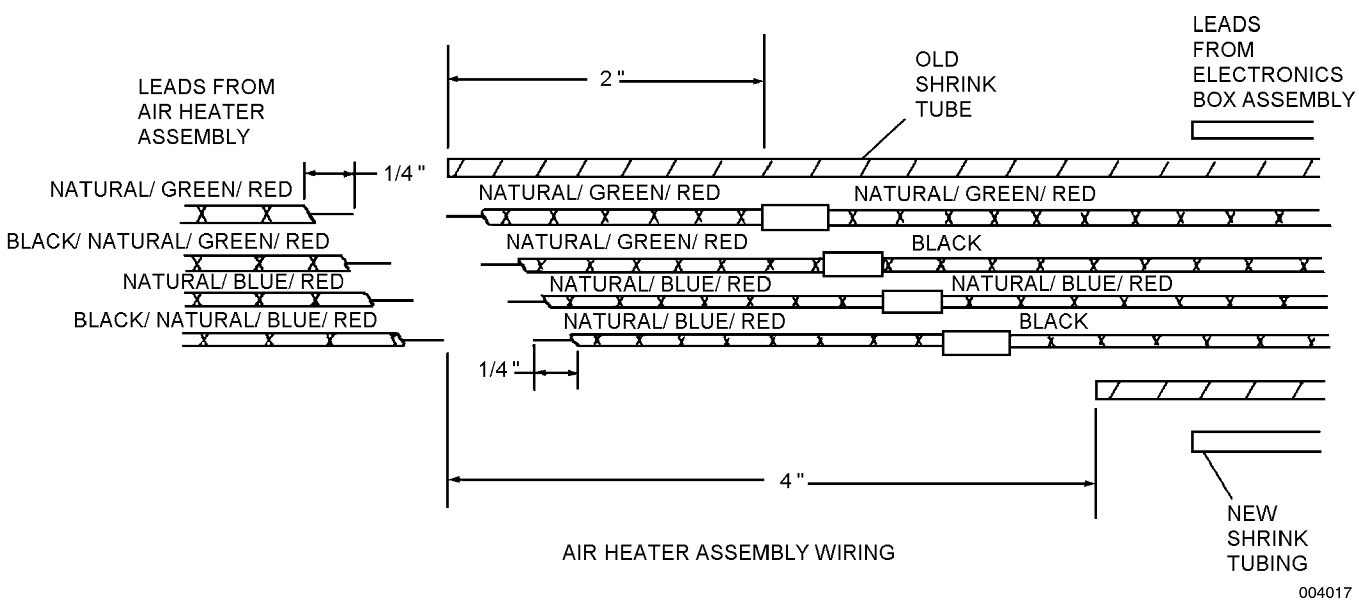
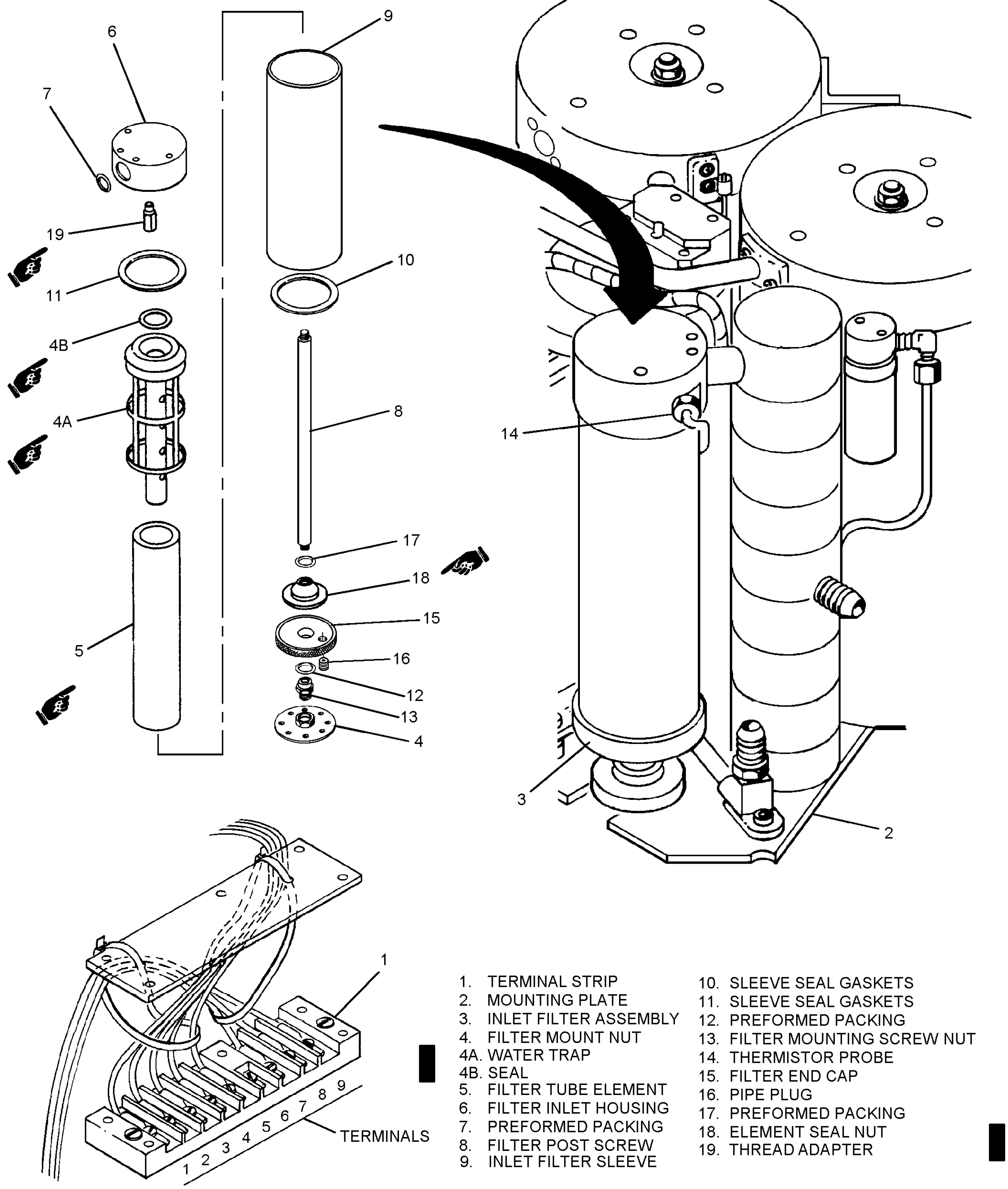


Figure 4-17. Air Heater Assembly Removal/Assembly



1. TERMINAL STRIP
2. MOUNTING PLATE
3. INLET FILTER ASSEMBLY
4. FILTER MOUNT NUT
4A. WATER TRAP
4B. SEAL
5. FILTER TUBE ELEMENT
6. FILTER INLET HOUSING
7. PREFORMED PACKING
8. FILTER POST SCREW
9. INLET FILTER SLEEVE
10. SLEEVE SEAL GASKETS
11. SLEEVE SEAL GASKETS
12. PREFORMED PACKING
13. FILTER MOUNTING SCREW NUT
14. THERMISTOR PROBE
15. FILTER END CAP
16. PIPE PLUG
17. PREFORMED PACKING
18. ELEMENT SEAL NUT
19. THREAD ADAPTER

004018

Figure 4-18. Inlet Filter Assembly Removal/Assembly

e. Remove and discard filter tube element (5).

f. Remove and discard sleeve seal gaskets (10) and (11) and preformed packing (12).

4-73. ELECTRONICS BOX ASSEMBLY REMOVAL. To remove the Electronics Box Assembly, proceed as follows:

NOTE

Do not cut wires connecting air heater and electronics box assemblies unless replacement of either assembly is necessary.

The electronics box assembly, air temperature sensor and shroud thermistor probes are matched assemblies and must be replaced as a set.

1. If not previously removed, remove screw from terminal (3) and remove two lead wires from terminal strip (figure 4-19).

2. Lay electronics box assembly off to side.

4-74. SIEVE BEDS, PLENUM, AND CHECK VALVE REMOVAL. To remove the Sieve Beds, Plenum, and Check Valve, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Pressure Sensitive	PPP-T-42

NOTE

Index numbers refer to figure 4-20 unless otherwise noted.

1. Remove check valve assembly (27) by performing the following:

a. Cut and remove tiedown straps (not shown) from two connector lock clips (5) and remove connector lock clips (5) from plenum sleeves (6).

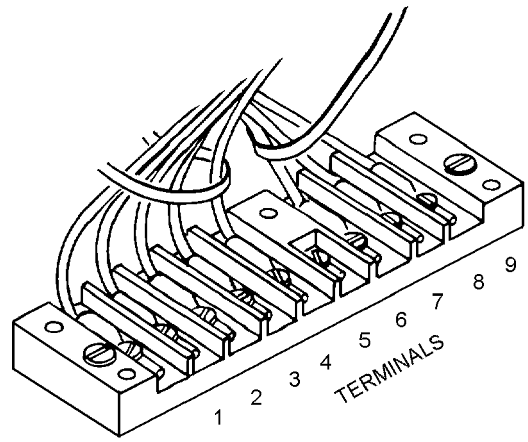


Figure 4-19. Terminal Strip

b. Retract two plenum sleeves (6) from sieve beds (7) and (8) by sliding plenum sleeves (6) into check valve assembly (27). This procedure will free check valve assembly (27) and plenum assembly (19) from two sieve beds (7) and (8).

c. Remove two plenum sleeves (6) from check valve assembly (27) and remove and discard two preformed packings (26).

d. Remove check valve cover (22) by removing five screws (20) and lockwashers (21). Remove and discard two preformed packings (24) and two preformed packings (25).

e. Carefully lift two check valves (23) out of plenum (19).

2. Separate sieve beds (7) and (8) by performing the following:

a. Remove and discard two preformed packings (9) from sieve beds (7) and (8) from which plenum sleeves (6) were removed.

b. Remove two screws (10) and lockwashers (11) securing L-bracket (12) to sieve beds (7) and (8) and remove L-bracket (12).

c. Remove shroud thermistor probe (4), loop clamp (3) and hangar strap (15) from sieve bed (7) by removing two screws (1) and (13) and lockwashers (2) and (14).

3. Place a piece of pressure sensitive tape over all open ports on plenum and two sieve beds to prevent contaminants from entering.

4-75. CLEANING OF DISASSEMBLED PARTS.

4-76. To clean the disassembled oxygen concentrator component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Toluene	TT-T-548 NIIN 00-281-2002
As Required	Xylene	TT-X-916 (CAGE 81348)

Support Equipment Required

Quantity	Description	Reference Number
1	Cleaning System, Energy, Sonic (Note 1)	SEC 1825

Notes: 1. If available (optional item)

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all electrical contact points by lightly furbishing with a fine abrasive material.

2. Clean all metallic parts in accordance with Chapter 4, NAVAIR 13-1-6.4-1. Blow dry with oil-free water-pumped nitrogen.

CAUTION

Do not attempt to clean any silicone rubber or elastic parts that have become contaminated with oil or grease. All such parts shall be replaced.

3. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free water pumped nitrogen.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

5. Remove old RTV adhesive by applying small amounts of xylene or toluene.

6. Remove old sealant from screws using small amounts of acetone.

4-77. INSPECTION OF DISASSEMBLED PARTS.

4-78. Carefully inspect the disassembled oxygen concentrator for cleanliness, irregular wear, and good condition using the following procedures and guidance.

1. Inspect all electrical wiring for cuts, breaks in insulation covering, and clean contact points; replace as necessary.

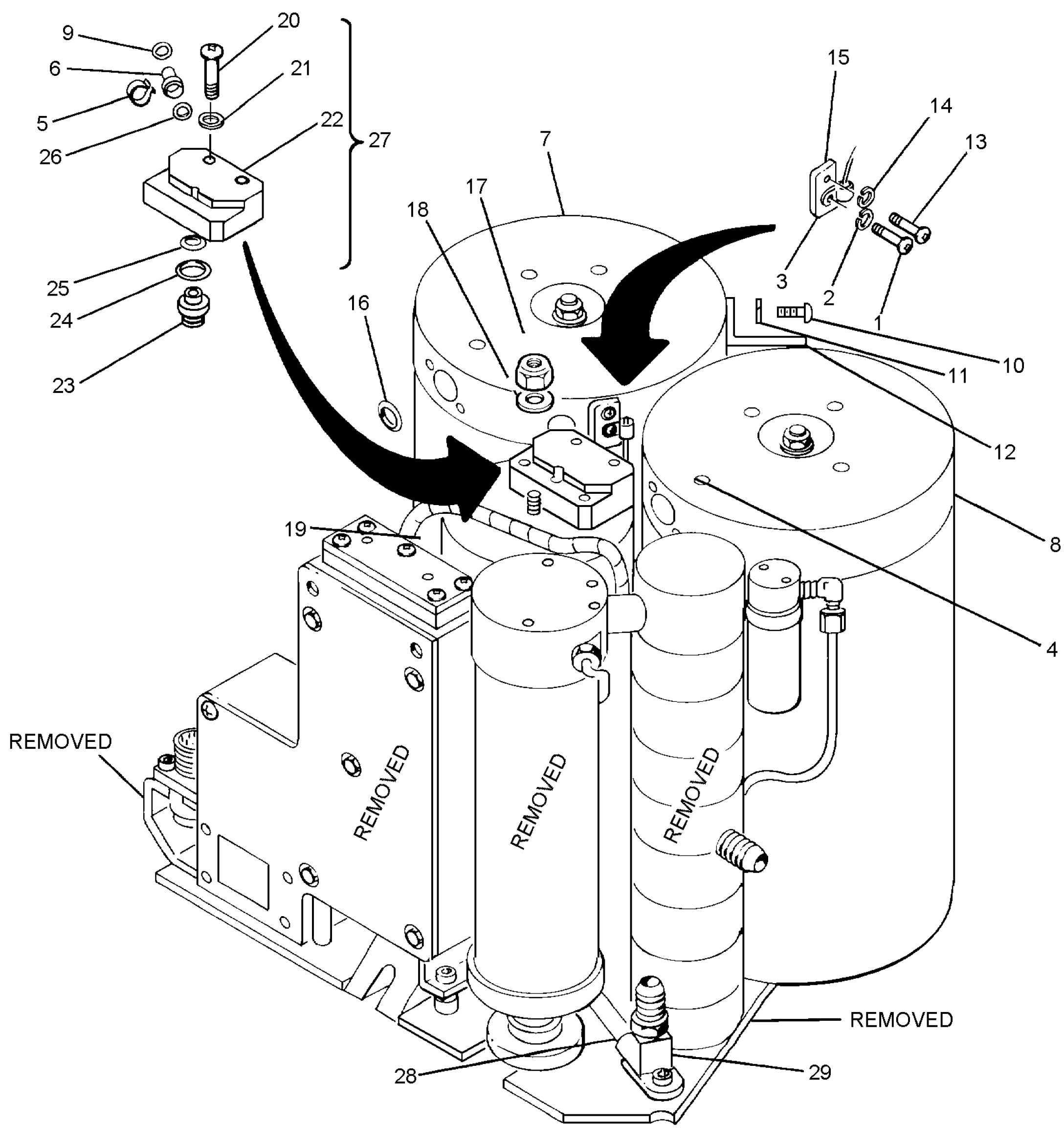
2. Inspect all screw for nicks, burrs, rounded screwdriver slots and other obvious damage; replace as necessary.

3. Inspect all metallic surfaces for corrosion, cleanliness, and other obvious damage; clean or replace parts as necessary.

4. Inspect sieve beds for tightness of self-sealing screw, nicks in sealing surfaces, stripped threads in screw holes, cleanliness; clean, replace or repair as necessary.

5. Inspect terminal board for cracks and breaks; replace if necessary.

6. Inspect electrical receptacle connector for bent pins, corrosion, and cleanliness; clean or replace as necessary.



1. SCREWS	16. PREFORMED PACKING
2. LOCKWASHER	17. SELF - LOCKING NUT
3. LOOP CLAMP	18. WASHER
4. SHROUD THERMISTOR PROBE	19. PLENUM ASSEMBLY
5. CONNECTOR LOCK CLIPS	20. SCREWS
6. PLENUM SLEEVES	21. LOCKWASHERS
7. SIEVE BED	22. CHECK VALVE COVER
8. SIEVE BED	23. CHECK VALVES
9. PREFORMED PACKINGS	24. PREFORMED PACKINGS
10. SCREWS	25. PREFORMED PACKINGS
11. LOCKWASHERS	26. PREFORMED PACKINGS
12. L - BRACKET	27. CHECK VALVE ASSEMBLY
13. SCREWS	28. OUTLET FITTING ASSEMBLY
14. LOCKWASHER	29. OUTLET FITTING
15. HANGAR STRAP	

004020

Figure 4-20. Sieve Beds, Plenum, and Check Valve Removal/Assembly

7. Inspect shroud assembly and insulation blanket for cuts, tears, and other obvious damage; repair or replace as necessary.

8. Inspect diffuser tube for pin holes and good condition; replace as necessary.

9. Inspect rotary valve, pressure reducer, inlet filter, heater, electronics box, and plenum assemblies for good condition; replace if necessary.

10. Inspect stabilizer and mounting plates for corrosion, breaks, bends, and good condition; clean, repair or replace as necessary.

11. Inspect check valve assemblies for smooth seating surfaces, cleanliness, bent or distorted springs, and freedom of operation; replace as necessary.

4-79. REPAIR.

4-80. Repair of the oxygen concentrator is limited to patching of the shroud assembly, replacing defective component parts, minor repairs (small dents, scratches, abrasions, nicks, etc.) of tubing and replacement of electrical connectors and defective wiring. To make minor repairs, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Clear	DC3145
As Required	Lacquer-Cellulose Nitrate, Gloss Color 622, Jet Black	MIL-L-7178
As Required	Material, Shroud	1647003-1
As Required	Wool, Aluminum	—

1. Tubing assemblies with minor dents not causing flow restriction are considered serviceable. Small scratches, abrasions, and nicks can be smoothed with a burnishing tool or aluminum wool.

2. To avoid burnishing the same area more than once, each burnished area shall be identified by a painted band. Color and size of band are as follows:

a. Color bands shall be black in color and shall cover an area not less than 2 inches nor more than 3 inches in length.

3. Tubing nicked, abraded, or scratched in an area previously identified as burnished shall be condemned.

4. To repair the shroud assembly, proceed as follows:

a. Cut a piece of shroud material to the desired length and width.

b. Clean the effected area of shroud assembly.

c. Apply adhesive as per direction on container and apply patch to shroud assembly.

4-81. ASSEMBLY.

4-82. To reassemble the oxygen concentrator, proceed as follows:

NOTE

Coat all preformed packings with Krytox 240 AC prior to installing.

4-83. SIEVE BEDS, PLENUM, AND CHECK VALVES ASSEMBLIES. To assemble the Sieve Beds, Plenum, and Check Valves Assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Sealant, Silicone, RTV 3145	GS-06F-12702 NIIN 00-145-0020
As Required	High Purity Goop	MS-TL-PGT (CAGE 02570) NIIN 00-701-9641
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Tape, Pressure Sensitive	PPP-T-42

NOTE

Index numbers refer to figure 4-20 unless otherwise noted.

1. Remove pieces of pressure sensitive tape from sieve beds and plenum ports previously installed.

2. Position two sieve beds as shown in figure 4-20.

3. Loosely attach loop clamp (3) and hangar strap (15) to sieve bed (7) with two screws (1) and (13) and lockwashers (2) and (14).

4. Slide shroud thermistor probe (4) into loop clamp (3) from top side of loop clamp and tighten two screws (1) and (13). Apply RTV adhesive over shroud thermistor probe.

5. Attach L-bracket (12) to sieve beds (7) and (8) and secure with two screws (10) and lockwashers (11).

6. Apply Krytox 240 AC to two preformed packings (16) and insert two preformed packings (16) into sieve beds (7) and (8).

7. Apply high purity goop antiseize to pipe threads of outlet fitting assembly (28) with outlet fitting adapter (29) removed and screw into base of plenum (19) as shown in figure 4-20.

8. Apply Krytox 240 AC to two preformed packings (24) and two preformed packings (25). Install two preformed packings (24) into respective grooves in top of plenum (19). Install two preformed packings (25) into check valve cover (22).

9. Install two check valves (23) into plenum (19).

10. Apply Krytox 240 AC to two preformed packings (26) and install preformed packings (26) into check valve cover (22).

11. Apply Krytox 240 AC to two preformed packings (9) and install two preformed packings (9) into sieve beds (7) and (8).

12. Attach check valve cover (22) with two preformed packings (25) on plenum (19) over check valves (23) and secure with five screws (20) and lockwashers (21).

13. Slide long portion of two plenum sleeves (6) into check valve assembly (27).

14. Route shroud thermistor probe (4) from sieve bed (7) under check valve assembly plenum sleeves (6) and tape to sieve bed (8) with pressure sensitive tape.

15. Insert plenum sleeves (6) into sieve beds (7) and (8) and secure with two connector lock clips (5).

4-84. INLET FILTER ASSEMBLY. To assemble the Inlet Filter Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive Sealant, Silicone, RTV 3145	GS-06F-12702
As Required	Compound, Sealant	Loctite 271
As Required	Compound, Sealant	Loctite 290
As Required	Krytox 240 AC	NIIN 00-961-8995 (CAGE 73925)
As Required	Tape, Anti-seize	MIL-T-27730A

NOTE

Index numbers refer to figure 4-18 unless otherwise noted.

1. Install preformed packing (12) on filter mount screw nut (13) and screw filter mount screw nut (13) onto filter post screw (8).

2. Screw filter mount nut (4) onto filter mount screw nut (13).

3. Install seal gasket (10) into filter post screw (8).

4. Install filter sleeve (9) onto filter post screw (8).

5. Install filter tube element (5) into water trap (4A).

5A. Install water trap (4A), seal (4B), and filter tube element (5) into inlet filter sleeve (9).

6. Install seal gasket (11) on top of filter tube element (5).

7. Install preformed packing (7) into filter inlet housing (6).

8. Screw filter inlet housing (6) onto filter post screw (8) and tighten filter mount screw nut (13) and torque filter mount screw nut (13) to 100 ±10 in-lb.

9. If air temperature sensor thermistor probe (14) was removed, re-install as follows:

a. Wrap threads of air temperature sensor thermistor probe nut with anti-seize tape.

b. Screw air temperature sensor thermistor probe (14) into inlet filter assembly (3).

c. Apply RTV adhesive over temperature sensor thermistor probe nut.

10. If element seal nut (18) was removed, re-install as follows:

a. Apply Krytox 240 AC to preformed packing (17) and install in element seal nut (18).

b. Apply sealant compound (Loctite 271) to threads of element seal nut and install element seal nut and preformed packing (17) onto filter post screw (8). Torque element seal nut to 130 to 150 in-lb.

11. If thread adapter (19) was removed, apply sealant compound (Loctite 290) to threads of thread adapter (19) and install thread adapter on filter inlet housing (6). Torque thread adapter to 140 to 160 in-lb.

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4-85. ELECTRONIC BOX AND AIR HEATER ASSEMBLY WIRING. To wire the Air Heater Assembly to the Electronics Box Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Cyanoacrylate, (Super Glue)	MIL-A-46050C NIIN 00-142-9193
	Compound, Sealant	MIL-S-22473GRA
As Required	Tape, Antiseize	MIL-T-27730A
64 inches	Tubing, Heat Shrink	1609568-11
16 inches	Tubing, Heat Shrink	1609568-2

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Crimping	3301094-6101 (CAGE 99251) NIIN 00-921-5771
1	Heater, Gun Type	—

NOTE

Refer to figure 4-17 when performing steps 1 through 4.

1. Remove old heat shrink tubing from bundle of wires.

CAUTION

Use extreme care not to cut through wiring when removing outer wire covering and stripping ends of wires for connecting.

2. Prepare wiring from air heater assembly as follows:

NOTE

Mark and tag leads for permanent identification.

a. Strip the end of the natural/green/red wire 1/4 inch for making connection.

b. Cut and remove 1/2 inch of outer casing of natural/green/red wire and strip end 1/4 inch.

c. Cut and remove 1 inch of outer casing of natural/blue/red wire and strip end 1/4 inch.

d. Cut and remove 1 1/2 inch of outer casing of natural/blue/red wire and strip end 1/4 inch.

e. Slide an 8-inch piece of new heat shrink tubing over bundled wires and slide heat shrink tubing to base of air heater assembly.

3. Prepare wiring from electronics box assembly as follows:

a. Measure wires 11 inches from grommet on electronics box and cut.

b. Strip each wire 1/4 inch on end.

c. Slide four 2-inch sections of new heat shrink tubing over individual wires and slide heat shrink tubing towards electronics box.

4. Splice wires from electronics box and air heater assembly as follows:

a. Match the two natural/blue/red wires (blue tracers) from air heater assembly to the two natural/blue/red wires (blue tracers) from electronics box.

b. Match the two natural/green/red wires (green tracers) from air heater assembly to the two natural/green/red wires (green tracers) from the electronics box assembly.

c. Using four connectors and crimping tool, splice matched wires in (a) and (b) above together.

WARNING

Heat gun can generate extreme heat that can cause severe burns.

d. Slide 2 inch piece of heat shrink tubing over each of the four crimped connectors and use heat gun to shrink tubing.

e. Slide an 8 inch piece of shrink tubing over the wires. Then, using heat shrink gun, shrink the tubing.

5. Attach electrical mounting offset to electronics box assembly as follows:

NOTE

Index numbers refer to figure 4-12 unless otherwise noted.

a. Using cyanoacrylate adhesive (super glue), secure strap (26) to cushion strap (25) and strap (24) to cushion strap (25).

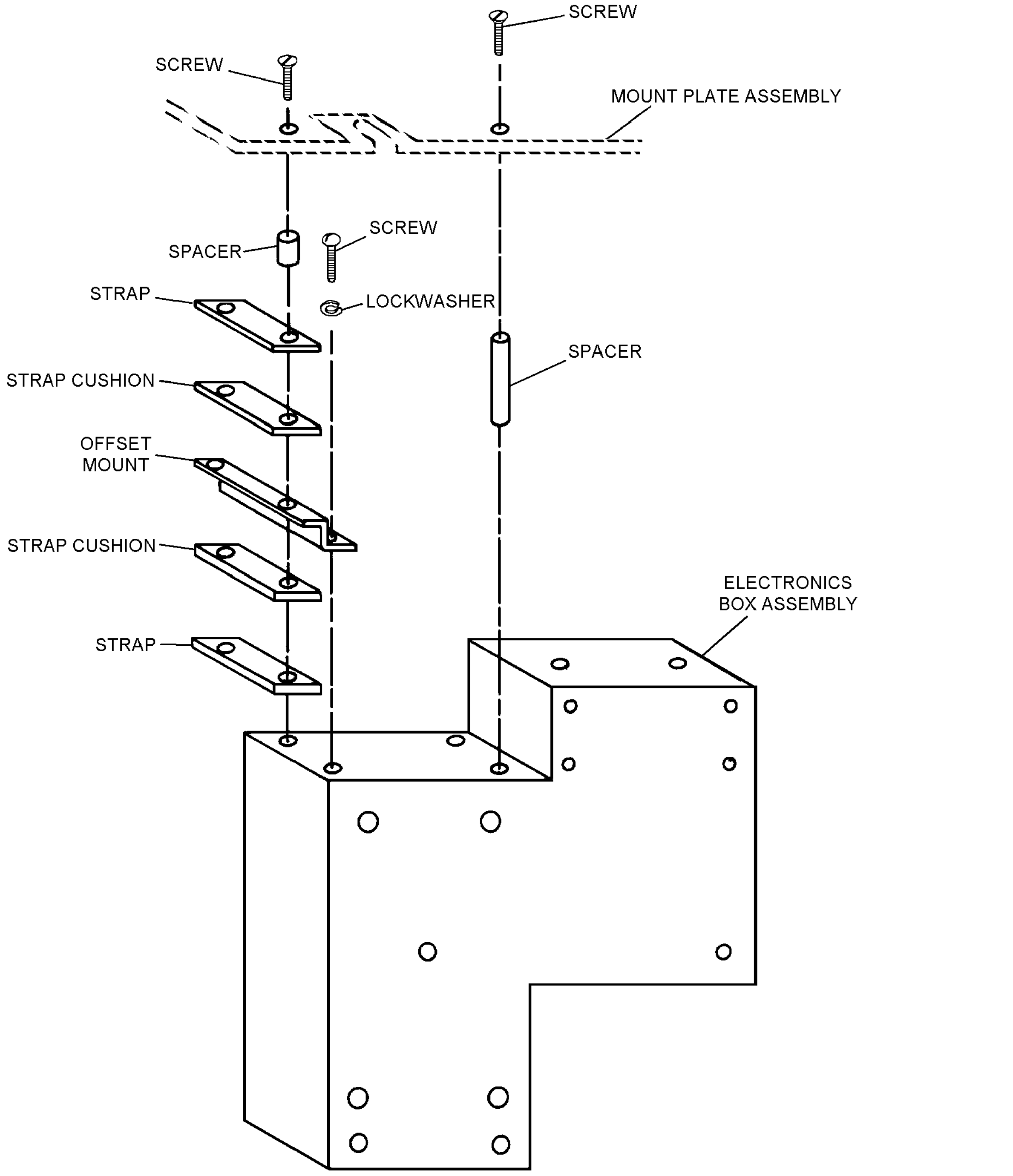

Figure 4-21. Securing Spacers to Electronics Box Assembly

b. Using super glue, secure strap (26) and cushion strap (25) and strap (24) and cushion strap (25) to electrical mounting offset (23) as shown.

c. Apply sealing compound to lower two threads of two screws (21) and secure electrical mounting offset to electronics box assembly (8) with two screws (21) and lockwashers (22).

d. Using a small amount of super glue, center and secure two small spacers (19) over two screws holes on electrical mounting offset (23) as shown in figure 4-21.

e. Using a small amount of super glue, center and secure two long spacers (20) over two screw holes in electronic box as shown in figure 4-21.

4-86. SOLENOID VALVE, AIR HEATER ASSEMBLY AND INLET FILTER ASSEMBLY. To assemble these components, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Anti-seize	MIL-T-27730A

NOTE

Index numbers refer to figure 4-22 unless otherwise noted.

1. Tape fitting on air heater assembly (2) where solenoid valve (1) attaches to air heater (2) with anti-seize tape.

2. Attach solenoid valve (1) to air heater assembly (2).

3. Tape pipe thread end of fitting and orifice assembly (3) with anti-seize tape and screw into solenoid valve (1).

4. Install preformed packing (4) onto first groove (7) of air heater (2).

NOTE

When attaching air heater assembly to inlet filter assembly, screw pins (6) shall slide into second groove (8) of air heater assembly (2).

5. Attach inlet filter assembly (5) to air heater assembly (2).

6. Insert two screw pins (6) into top of inlet filter assembly (5) and tighten.

4-87. SHROUD ASSEMBLY AND MOUNTING PLATE ASSEMBLY. To assemble the Shroud Assembly and Mounting Plate Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	MIL-S-22473GRA

NOTE

Index numbers refer to figure 4-12 unless otherwise noted.

1. Position insulation blanket (32) inside of shroud assembly (31).

2. Position shroud assembly (31) and insulation blanket (32) on mounting plate (3).

3. Install two clamps (29) on diffuser tube (30).

4. Apply sealing compound to first two threads of two screws (27).

5. Position diffuser tube (30) on mounting plate (3) and secure with two screws (27) and lockwashers (28).

4-88. ROTARY VALVE ASSEMBLY TO SIEVE BEDS. To assemble Rotary Valve Assembly to Sieve Beds, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	MIL-S-22473GRA
1	Packing, Preformed -or-	1602321-5
1	Packing, Preformed -or-	AS3582-016
1	Packing, Preformed	MS28775-016
2	Screw	MS35265-13 NIIN 00-849-8072
2	Screw, Cap, Socket Head	56040-94-4 NIIN 00-958-9402
As Required	Wire, Safety, Corrosion Resistant Steel, 0.020	NIIN 00-221-2650

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 30 in-lb	TEC3A or equivalent
1	Wrench, Torque, 300 in-lb	TE25A or equivalent

NOTE

Index numbers refer to figure 4-15 unless otherwise noted. Pan head screws are no longer used to secure vent tube to the rotary valve assembly. Use screw P/N MS35265-13 or socket head cap screw P/N 56040-94-4. If vent tube preformed packing P/N 1602321-5 is not available, substitute with preformed packing P/N AS3582-016 or P/N MS28775-016.

1. Insert preformed packing (not shown) onto vent tube (11) flange and install vent tube (11) onto rotary valve (9).

CAUTION

Ensure strict compliance with procedures when performing step 2. Non-compliance could cause rotary valve vent tube (11) to loosen or crack.

2. Apply sealant compound (MIL-S-22473, Grade A) to lower two threads of two screws (11A) and secure vent tube (11) to rotary valve (9) with two screws (11A) and two lockwashers (not shown). Using torque wrench (TEC3A) or equivalent, torque screws (11A) to 10 $\pm$0.5 in-lb.

3. Position concentrator with vent tube facing forward and to the left, safety wire two screws (11A) by routing 0.020 steel safety wire through screw (11A) closest to the plenum assembly (13) then around vent tube (11) and through outboard screw (11A).

4. Insert tube flanges (12) into sieve beds (8) and secure with four screws (6) and lockwasher (7).

4-89. ELECTRONIC BOX, PLENUM, SIEVE BEDS, ROTARY VALVE, INLET FILTER, AND AIR HEATER ASSEMBLIES TO MOUNTING PLATE. To assemble these components to the Mounting Plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Heat Sink, Silicone	Dow Corning 340

Support Equipment Required

Quantity	Description	Reference Number
1	Board, Peg	Fabricate IAW figure 4-9
1	Wrench, Torque, 30 in-lb	TEC3A or equivalent
1	Wrench, Torque, 300 in-lb	TEC25A or equivalent

NOTE

Index numbers refer to figure 4-12 unless otherwise noted.

Apply sealing compound to lower two threads of all screws when installing screws.

1. Turn sieve beds (17), plenum (18), and rotary valve (4) over as shown.

2. Install nine cut-off bolts (figure 4-10) in two sieve beds (17) and plenum (18).

3. Remove height adjustment flat washers (16) from peg board and install on nine cut-off bolts in same location on sieve beds (17) and plenum (18) as removed from peg board.

4. Apply silicone heat sink compound to portion of rotary valve that touches mounting plate.

5. Position mounting plate (3), insulation blanket (32) and shroud assembly (31) onto sieve beds (17), plenum (18), and rotary valve (4). Install outlet fitting adapter (33) onto straight adapter (35) and align screw hole in adapter (33) with mounting plate (3).

CAUTION

Use care when performing step 6 not to disturb height adjustment washer (16) previously installed. When installing nine screws (9) do not tighten down all the way.

6. Remove one cut-off bolt at a time from two sieve beds (17) and plenum (18) and replace with one of nine screws (9).

7. Mount rotary valve assembly (4) to mounting plate (3) and secure with three screws (1) and lockwasher (2).

8. Apply silicone heat sink compound to flat portion of electronic box that comes in contact with mounting plate. Insert shroud assembly (31) into electronics box (8) and secure with two screws (34). Route electrical connector (36) through slit in shroud assembly (31). Secure electronic box (8) to mounting plate (3) with two screws (5) and two screws (6).

NOTE

If removed during disassembly, attach two cushion straps (15) and nut plate (14) to air heater assembly (13) and secure with sealing compound.

9. Attach diffuser tube (30) to 90° fitting on solenoid valve and tighten. Mount air heater assembly (13) to mounting plate (3) and secure with two screws (12).

10. Rotate mount nut on end of inlet filter assembly (11) until the two screw holes align with holes in mounting plate (3). Secure inlet filter assembly (11) to mounting plate (3) with two screws (10).

11. Using torque wrench (P/Ns TE25A, TEC3A or equivalent) as applicable, torque all screws as follows:

a. Air heater assembly two screws (12) 10 ±1 in-lb.

b. Inlet filter assembly two screws (10) 23 ±2 in-lb.

c. Sieve beds and plenum nine screws (9) 195 ±10 in-lb.

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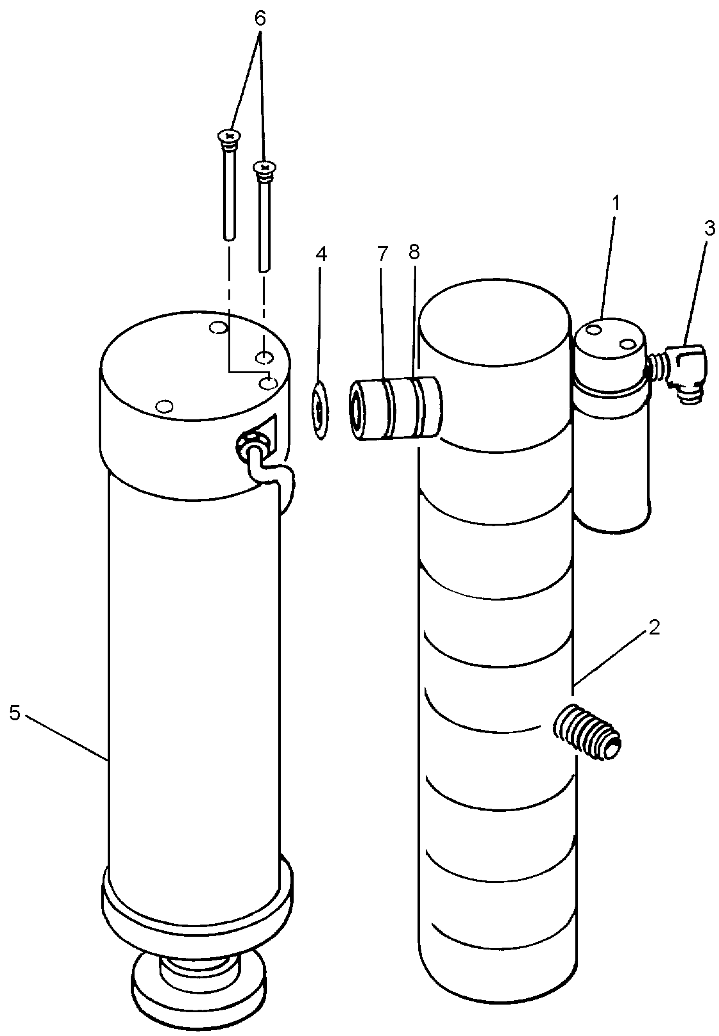

1. SOLENOID VALVE
2. AIR HEATER ASSEMBLY
3. ORIFICE ASSEMBLY
4. PREFORMED PACKING
5. INLET FILTER ASSEMBLY
6. SCREW PINS
7. AIR HEATER, FIRST GROOVE
8. AIR HEATER, SECOND GROOVE

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Figure 4-22. Solenoid Valve, Air Heater Assembly and Inlet Filter Assembly

d. Electronics box two screws (5) 30 ±2 in-lb, two screws (6) 3 ±1 in-lb, and two screws (7) 23 ±2 in-lb.

e. Rotary valve three screws (1) 16 ±2 in-lb.

12. Turn concentrator over so it is setting upright.

NOTE

Index numbers in steps 13, 14, and 15 refer to figure 4-11 unless otherwise noted.

13. Secure outlet fitting (8) to mounting plate (16) with screw (4), lockwasher (5) and flat washers (6) and (7).

14. Mount electrical connector bracket (13) to mounting plate (16) and secure with two screws (14) and lockwashers (15).

15. Attach receptacle connector (12) to electrical connector bracket (13) and secure with four screws (10) and lockwashers (11).

4-90. INSTALLATION OF ELECTRICAL WIRING TERMINAL LEADS ON TERMINAL STRIP. To install Electrical Wiring Terminal Leads on Terminal Strip, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Cyanoacrylate (Super Glue)	MIL-A-46050C
As Required	Adhesive Sealant, Silicone, RTV 3145	GS-06F-12702 NIIN 00-145-0020

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Installation	MS90387-1 NIIN 00-781-7891

NOTE

Refer to figure 4-8 for details of terminal strip configuration.

1. Ensure air temperature sensor thermistor probe is routed under and between filter and air heater assemblies. Connect one terminal lead of the air temperature sensor thermistor probe from the inlet filter assembly to the number one terminal on the terminal strip and secure with screw.

2. Connect remaining terminal lead of the air temperature sensor thermistor probe from inlet filter assembly and one terminal lead from shroud thermistor probe coming from sieve bed to number two terminal of terminal strip and secure with screw.

3. Connect remaining terminal lead from shroud thermistor probe coming from sieve bed to number three terminal of terminal strip and secure with screw.

4. Connect terminal leads for the solenoid valve to the number four and five terminal of terminal strip and secure with two screws.

NOTE

Number six terminal on terminal strip is not used.

5. Connect the brown and blue terminal leads for the rotary valve assembly to the number seven terminal of terminal strip and secure with screw.

6. Connect the black terminal lead for the rotary valve assembly to the number eight terminal of terminal strip and secure with screw.

7. Connect the red terminal lead for the rotary valve assembly to the number nine terminal of terminal strip and secure with screw.

8. Apply RTV silicone adhesive evenly over all wire leads and the terminal strip.

9. Route two small tiedown straps loosely around wires and through holes on cover (3) as shown in figure 4-8.

10. Attach cover (3) to terminal strip (l) and secure loosely with five screws (2). Tighten tiedown straps using installation tool. Tighten all five screws (2) evenly.

11. Secure shroud thermistor probe wire with a small tiedown strap to the check valve sleeve that goes into sieve bed (P/N 1630850-6).

12. Secure wires to the rotary valve tube flange with a large tiedown strap at the point where the tube flange is secured to sieve bed (P/N 1630850-6).

13. Secure wires for air temperature sensor thermistor probe at the inlet filter assembly with a small tiedown strap around air temperature sensor thermistor probe nut and wires.

14. Secure all wires together above the terminal block with six small tiedown straps.

15. Secure wire bundle completed in step 14 above to rotary valve tube flange that goes to sieve bed (P/N 1630850-6) with a large tiedown strap at a point just prior to curve in tube flange that goes to rotary valve.

16. Using two small tiedown straps, secure wires together just off terminal block in direction leading down side of electronics box assembly.

17. Secure wires together coming from base of rotary valve assembly and electrical connector with two small tiedown straps.

18. Using a small amount of cyanoacrylate adhesive (super glue), center and secure two spacers (14) (figure 4-13) over two screw holes in rotary valve (13) (figure 4-13) as shown.

4-91. STABILIZER PLATE ATTACHMENT. To attach Stabilizer Plate to the concentrator, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 30 in-lb	TEC3A or equivalent
1	Wrench, Torque, 300 in-lb	TE25A or equivalent

NOTE

Index numbers refer to figure 4-14 unless otherwise noted.

1. Attach thread seal washer (18) on threaded post of plenum assembly (21).

2. Position tube clamp (19) on threaded post of plenum assembly (21) and over rotary valve (13) tube flange.

3. Position spacer (7) on inlet filter assembly (8) and two spacers (4) on solenoid valve (5).

CAUTION

Use extreme care when positioning stabilizer plate between plenum and electronics box assemblies to prevent cutting electrical wiring.

4. Carefully position stabilizer plate (2) over concentrator components and between plenum assembly (21) and electronics box assembly (12).

5. Insert two screws (3) into stabilizer plate (2) and through two spacers (4) and tighten loosely.

6. Insert six screws (1) into two sieve beds (20) and inlet filter assembly (8) and tighten loosely.

7. Insert two screws (15) into stabilizer plate (2) through two spacers (14) and screw into rotary valve (21) loosely.

8. Install flat washer (17) on threaded post of plenum (21) and secure with nut (16).

9. Secure electronic box (12) to stabilizer plate (2) with two screws (9) and lock washer and flat washers (10) and (11).

10. Tighten all screws hand tight.

11. Using torque wrench (P/Ns TE25A, TEC3A or equivalent) as applicable, torque all screws as follows:

a. Rotary valve two screws (15) 28 ±2 in-lb.

b. Electronics box two screws (9) 28 ±2 in-lb.

c. Solenoid valve two screws (3) 28 ±3 in-lb.

d. Sieve beds and inlet filter assembly six screws (1) 75 ±5 in-lb.

e. Plenum self-locking nut (16) 80 ±5 in-lb.

4-92. PRESSURE REDUCER ASSEMBLY. To assemble the Pressure Reducer Assembly to the concentrator, proceed as follows:

NOTE

Install pressure reducer assembly after installation of stabilizer plate.

Index numbers refer to figure 4-14 unless otherwise noted.

1. Install preformed packing (11) on pressure reducer (3) tube flange.

2. Install preformed packing (9) on Pressure Reducer Assembly (3).

3. Insert pressure reducer tube flange into inlet filter assembly (4) and secure with two pan head screws (1) and lockwashers (2).

4. Secure wiring bundle to Pressure Reducer Assembly (3) with two large tiedown straps (5).

5. Secure Pressure Reducer Assembly (3) to rotate valve assembly (10) using two screws (6) and (8) and lockwashers (7).

4-93. SCHEDULED MAINTENANCE.

4-94. The filter tube element (5, figure 4-18) shall be replaced every 500 flight hours during bench test. The shroud assembly may also be replaced at this time if necessary. Refer to Disassembly (paragraphs 4-64) and Assembly (paragraphs 4-81) for instructions.

4-95. ROTARY VALVE ASSEMBLY REPAIR PROCEDURES. If the rotary valve assembly fails, forward it to the major contractor for overhaul. The contractor for rotary valve overhaul is:

Northrop Grumman
P.O. Box 4508
Hickory Grove Road
Davenport, IA.
52808-4508

4-96. REPLACEMENT OF INLET FILTER ASSEMBLY PARTS.

Materials Required

Quantity	Description	Reference Number
As Required	Tape, Anti-seize	MIL-T-27730A
As Required	Lacquer, Black	MIL-L-7178

Support Equipment Required

Quantity	Description	Reference Number
1	Drill Bit, 1/32 in.	—
1	Gage, Plug 0.015 to 0.025 in.	—
1	Brush, Wire	—

NOTE

If the serial number is RHZ097 or above, or has an SEU prefix, or if the inlet filter assembly is marked Part Number 1631030-2, or outer rim of filter end cap (15, figure 4-23) is marked with black lacquer, filter assembly modification is not required.

If the Serial Number is without an RHZ or SEU prefix, or is RHZ096 or below, or if the inlet filter assembly is Part Number 1631030-1, or filter end cap is not marked or filter element requires replacement, proceed as follows:

Index numbers refer to figure 4-18 unless otherwise noted.

1. Remove inlet filter assembly in accordance with paragraph 4-72.

2. Insert plug gage into drain hole of pipe plug (16) located in filter end cap (15); if plug gage can be inserted into drain hole, proceed to step 7. If plug gage cannot be inserted into drain hole, proceed to step 3.

3. Remove filter post screw (8) from inlet filter housing (6).

4. Remove pipe plug (16) from filter end cap (15).

NOTE

If pipe plug (16) is P/N 1631919-1 (0.015 - 0.025 plug gage cannot be inserted into drain hole of pipe plug P/N 1631919-1), replace pipe plug P/N 1631919-1 with new pipe plug P/N 1631919-2. If pipe plug P/N 1631919-2 is not available, modify pipe plug P/N 1631919-1 by performing step 5. If pipe plug P/N 1631919-2 is available, proceed to step 6.

5. Remove white substance from pipe plug (16) using wire brush. Using drill with 1/32-inch drill bit, drill bleed port of pipe plug (16) to 1/32-inch size.

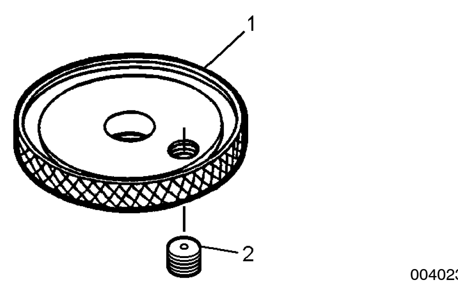

Figure 4-23. Filter End Cap

6. Paint filter end cap (15) with black lacquer as shown by the cross-hatched shaded area in figure 4-23.

7. Wrap pipe plug (P/N 1631919-2) (ISA) with anti-seize tape and install in filter end cap (15).

8. Install filter post screw (P/N 1631079-2) (8) into filter inlet housing (6).

9. Install inlet filter assembly in accordance with paragraph 4-84.

10. Perform Bench Test in accordance with paragraph 4-26.

Section 4-5. Illustrated Parts Breakdown

4-97. GENERAL.

4-98. This section lists and illustrates the assemblies and detail parts of the OEAS Oxygen Concentrator, Type GGU-7/A, P/N 3261009-0105 manufactured by Litton Life Support, formerly Clifton Precision (CAGE 99251).

4-99. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

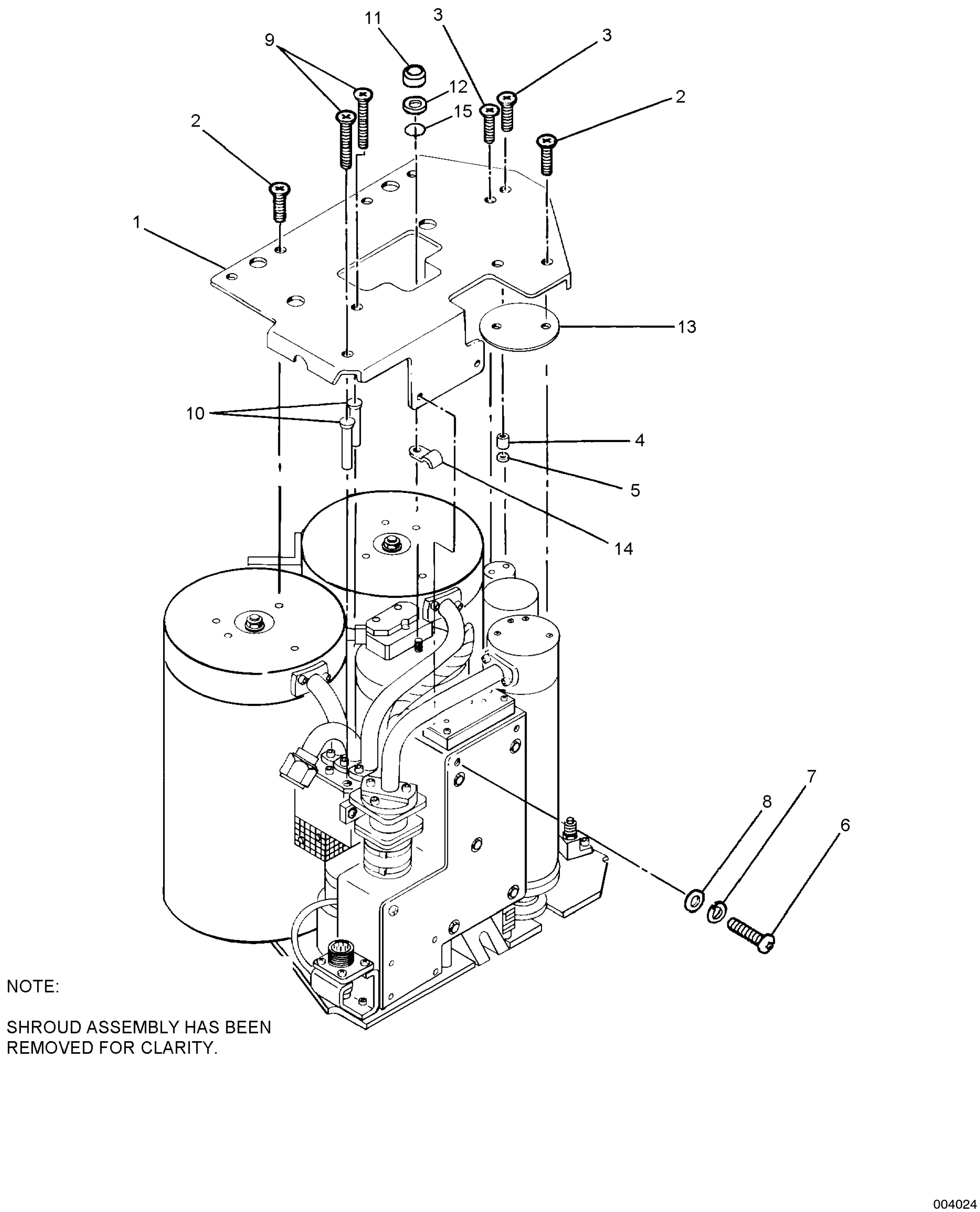

Figure 4-24. Stabilizer Plate

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-24	3261009-0105	CONCENTRATOR, OXYGEN MOLECULAR ..... SIEVE (GGU-7/A)	REF	
	1631000-1	. PLATE AND COMPONENT ASSEMBLY	REF	
-1	1631550-1	. . STABILIZER PLATE	1	
		(ATTACHING PARTS)		
-2	MS51960-84	. . SCREW, Machine	6	
-3	MS51959-46	. . SCREW, Machine	2	
-4	1631547-1	. . SPACER	2	
-5	AN960C10L	. . WASHER, Flat	AR	
-6	MS51958-60	. . SCREW, Machine	2	
-7	MS35338-138	. . WASHER, Lock	2	
	MS35338-157	. . WASHER, Lock (Alternate)	2	
-8	NAS620C10L	. . WASHER, Flat	2	
-9	MS51959-73	. . SCREW, Machine	2	
-10	1631546-1	. . SPACER	2	
-11	MS21043-5	. . NUT, Self-Locking	1	
-12	1603660-262	. . WASHER, Flat	1	
		---*---		
-13	1631886-1	. . SPACER	1	
-14	1631163-1	. . CLAMP, Tube	1	
-15	1630992-1	. . WASHER, Thread Seal	1	

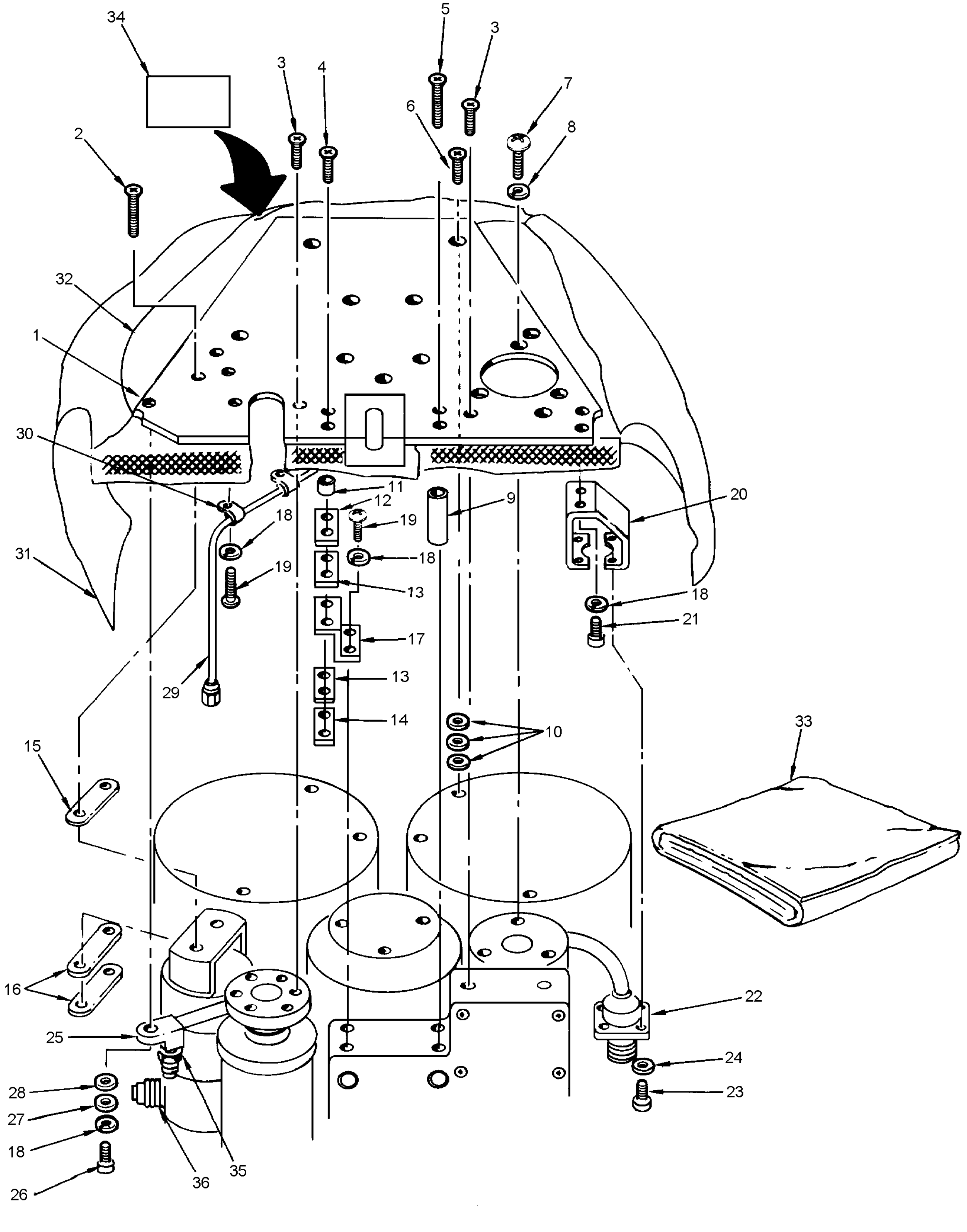

Figure 4-25. Shroud Assembly/Mounting Plate

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-25	3261009-0105	CONCENTRATOR, OXYGEN MOLECULAR . . . . . SIEVE (GGU-7/A)	REF	
	1631000-1	. PLATE AND COMPONENT ASSEMBLY	REF	
-1	1630985-3	. . MOUNTING PLATE	1	
		(ATTACHING PARTS)		
-2	MS51960-67	. . SCREW, Machine	2	
-3	MS51960-65	. . SCREW, Machine	4	
-4	MS51960-69	. . SCREW	2	
-5	1632344-1	. . SCREW, Special	2	
-6	MS51960-100	. . SCREW	9	
-7	MS51957-45	. . SCREW	3	
-8	MS35338-156	. . WASHER, Lock	3	
	MS35338-137	. . WASHER, Lock (Alternate)	3	
-9	1631087-1	. . SPACER	2	
-10	1603660-262	. . WASHER, Flat	AR	
-11	1631087-4	. . SPACER	2	
-12	1632225-1	. . STRAP	1	
-13	1632226-1	. . STRAP, Cushion	2	
-14	1632225-2	. . STRAP	1	
-15	1632234-1	. . PLATE, Nut	1	
-16	1632227-1	. . STRAP, Cushion	2	
		---*---		
-17	1631154-1	. . OFFSET, Electrical Mount	1	
		(ATTACHING PARTS)		
-18	MS35338-138	. . WASHER, Lock	11	
-19	MS51958-60	. . SCREW	4	
		---*---		
-20	1630853-1	. . BRACKET, Elect. Connector	1	
		(ATTACHING PARTS)		
-21	NAS1351C3-5	. . SCREW	2	
		---*---		
-22	MS3102R18-9P	. . CONNECTOR, Receptacle	REF	
		(ATTACHING PARTS)		
-23	NAS1352C04-5	. . SCREW	4	
-24	MS35338-135	. . WASHER, Lock	4	
	MS35338-157	. . WASHER, Lock (Alternate)	4	
		---*---		
-25	1632111-1	. . OUTLET FITTING ASSEMBLY	1	
		(ATTACHING PARTS)		
-26	NAS1351C3-8	. . SCREW	1	
-27	AN960C10L	. . WASHER, Flat	AR	
-28	AN960C10L	. . WASHER, Flat	AR	
		---*---		
-29	1630995-1	. . TUBE, Diffuser	1	
		(ATTACHING PARTS)		
-30	AN742D3	. . CLAMP	2	
		---*---		

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-25-31	1631160-1	. . SHROUD ASSEMBLY	1	
-32	1631161-1	. . BLANKET, Insulation	1	
-33	1647003-1	. . SHROUD, Material, Repair	1	
-34	1619531-1	. . PLATE, Ident	1	
-35	AN816-5J	. . NIPPLE	1	
-36	812787-9	. . PROTECTIVE CAP	1	

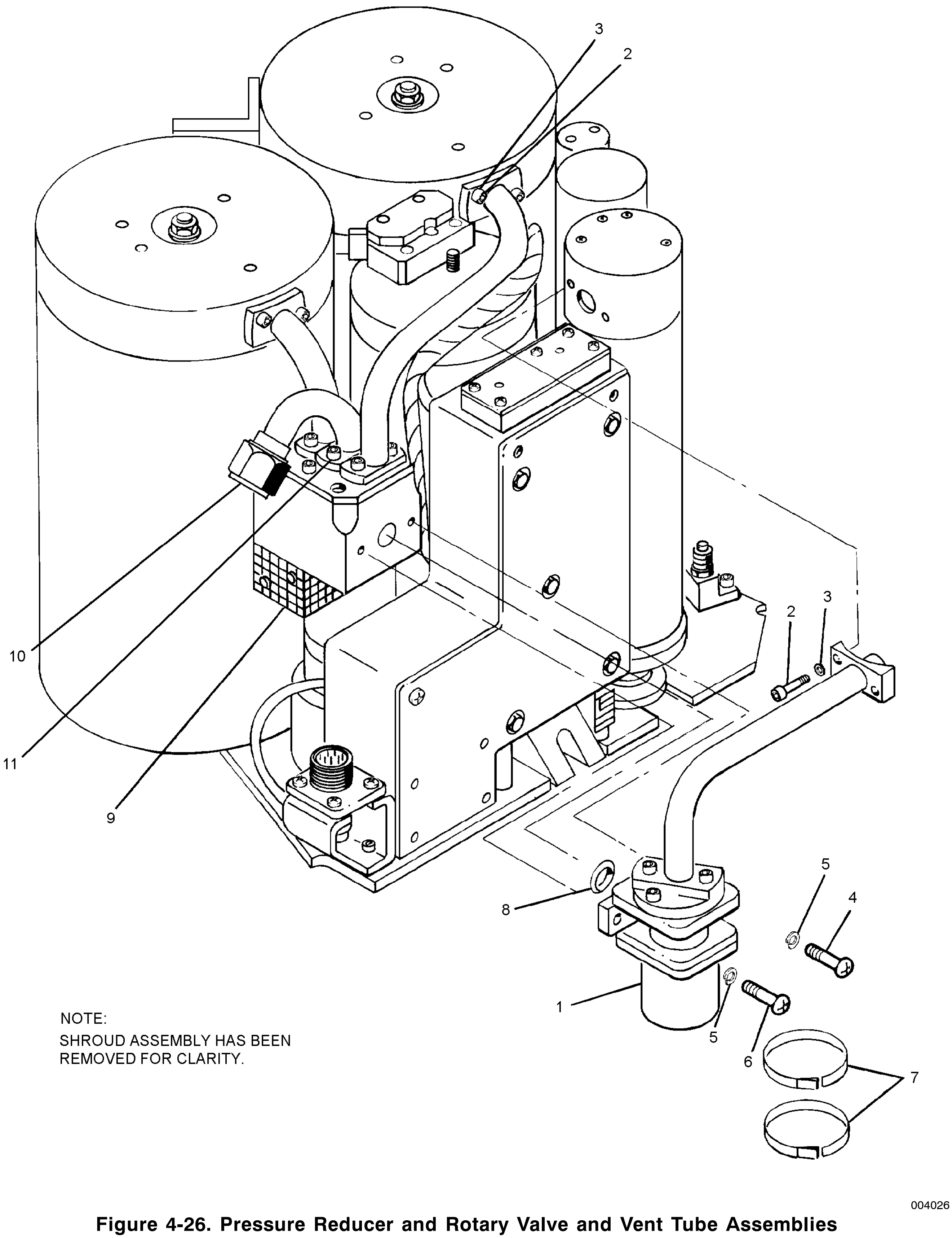

Figure 4-26. Pressure Reducer and Rotary Valve and Vent Tube Assemblies

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-26	3261009-0105	CONCENTRATOR, OXYGEN MOLECULAR . . . . . SIEVE (GGU-7/A)	REF	
	1631000-1	. PLATE AND COMPONENT ASSEMBLY	REF	
-1	1630840-1	. . PRESSURE REDUCER ASSEMBLY . . . . (ATTACHING PARTS)	1	
-2	NAS1352C04-5	. . SCREW, Panhead	8	
-3	MS35338-135	. . WASHER, Lock	8	
	MS35338-154	. . WASHER, Lock (Alternate)	8	
-4	MS51957-63	. . SCREW, Panhead	1	
-5	MS35338-138	. . WASHER, Lock	2	
	MS35338-157	. . WASHER, Lock (Alternate)	2	
-6	MS51957-66	. . SCREW . . . . ---*---	1	
-7	MS3367-2-9	. . STRAP, Tiedown	2	
-8	1602321-5	. . PACKING, Preformed	2	
	AS3582-016	. . PACKING, Preformed	1	
	MS28775-016	. . PACKING, Preformed	1	
-9	1630830-1	. . ROTARY VALVE ASSEMBLY	1	
-10	1630869-1	. . VENT TUBE	1	
-11	MS35265-13	. . SCREW	2	
	56040-94-4	. . SCREW, Cap, Socket Head	2	

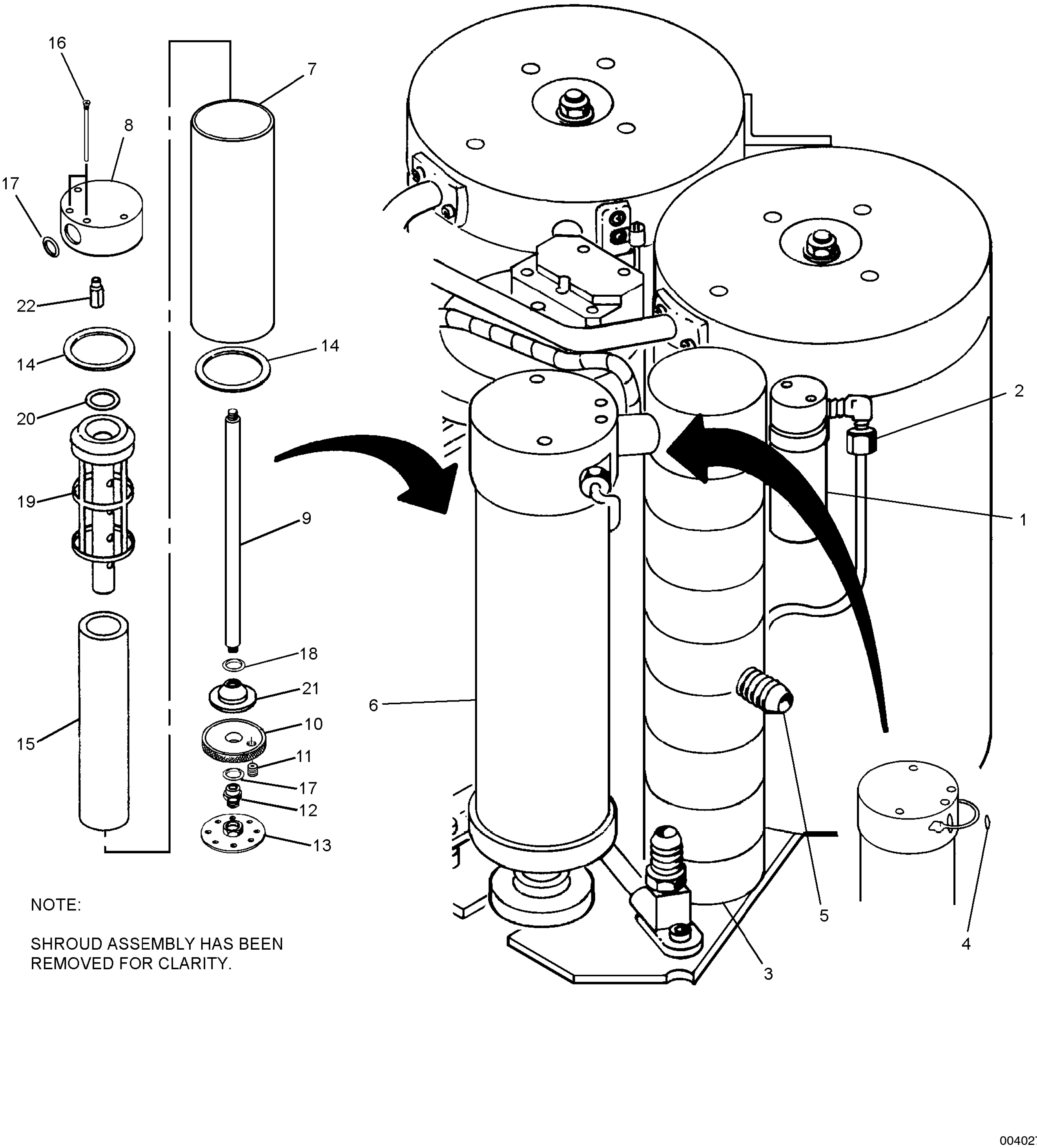

Figure 4-27. Solenoid Valve, Air Heater Assembly and Inlet Filter Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-27	3261009-0105	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-7/A)	REF	
	1631000-1	. PLATE AND COMPONENT ASSEMBLY	REF	
-1	1631040-1	. . VALVE, Solenoid	1	
-2	1631167-1	. . FITTING AND ORIFICE ASSEMBLY	1	
-3	1632410-1	. . HEATER ASSEMBLY, Air	1	
-4	1631321-5	. . PACKING, Preformed	1	
-5	MS90376-14R	. . PROTECTIVE CAP	1	
-6	1657476-1	. . INLET FILTER ASSEMBLY	1	
-7	1631081-1	. . . SLEEVE, Inlet Filter	1	
-8	1631048-1	. . . HOUSING, Filter Inlet	1	
-9	1631079-2	. . . SCREW, Filter Post	1	
-10	1631074-1	. . . CAP, Filter End	1	
-11	1631919-2	. . . PIPE PLUG	1	
-12	1631077-2	. . . SCREW NUT, Filter Mount	1	
-13	1632185-1	. . . NUT, Filter Mount	1	
-14	1631075-2	. . . GASKET, Sleeve Seal	2	
-15	1643231-1	. . . ELEMENT, Filter Tube	1	
	100-25-DX	. . . ELEMENT, Filter Tube (Note 1)	1	
-16	1631049-1	. . . SCREW PINS	2	
-17	1602321-5	. . . PACKING, Performed	2	
-18	MS9068-012	. . . PACKING, Performed	1	
	AS3582-012	. . . PACKING, Preformed (Alternate)	1	
-19	1653300-1	. . . TRAP, Water	1	
-20	1646811-3	. . . SEAL	1	
-21	1631082-1	. . . NUT, Element Seal	1	
-22	1631076-1	. . . ADAPTER, Thread	1	

Notes: 1. Filter elements can also be ordered thru normal supply channels under NIIN 01-170-2554.

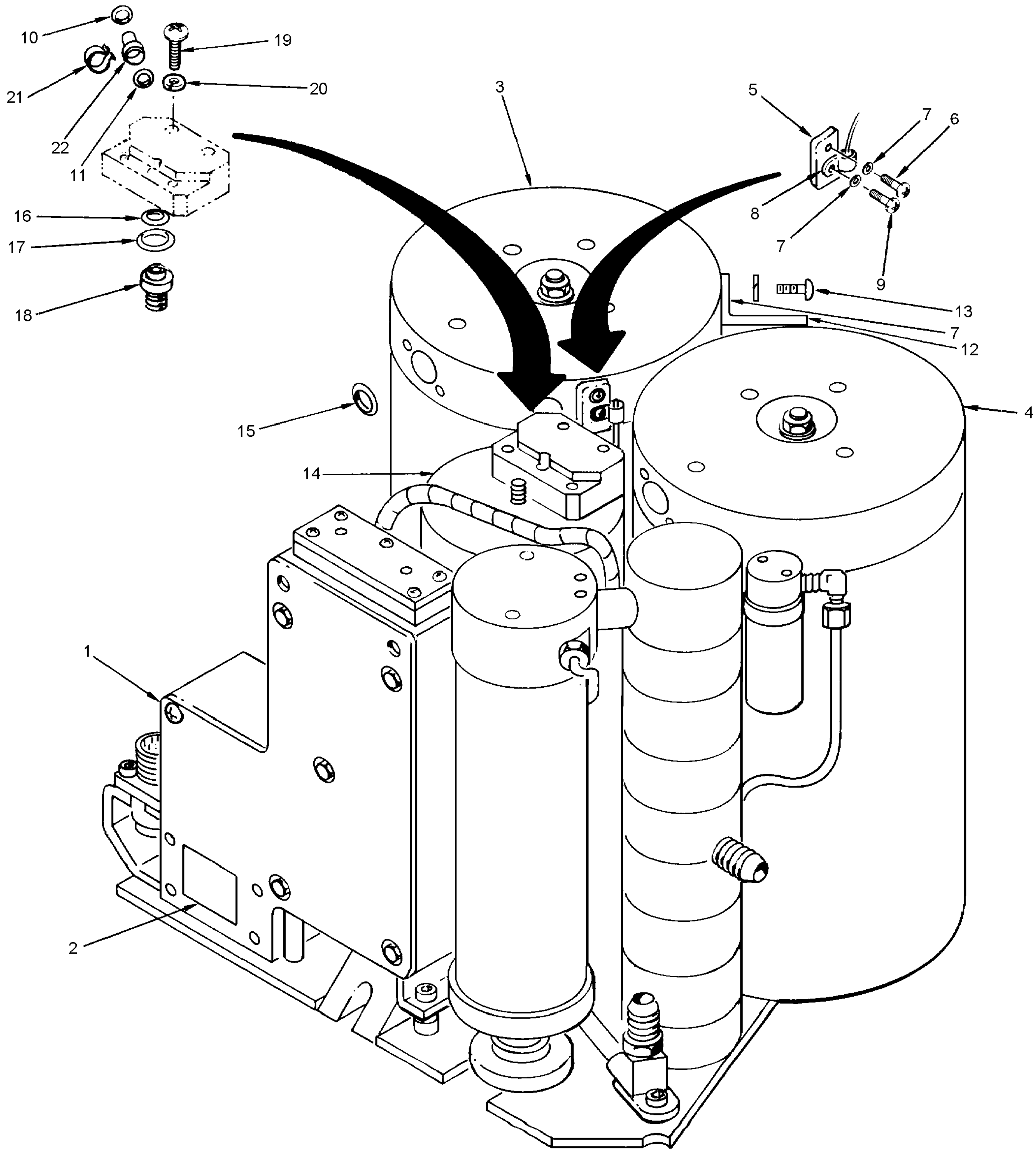

Figure 4-28. Electronics Box Assembly, Sieve Beds and Plenum Assembly with Check Valves

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
4-28	3261009-0105	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-7/A)	REF	
	1631000-1	. PLATE AND COMPONENT ASSEMBLY	REF	
-1	1631372-1	. . ELECTRONICS BOX ASSEMBLY	1	
-2	1644246-1	. . DECAL, Warning	1	
	1601373-1	. . BED ASSEMBLIES, Molecular Sieve (Note 1)	1	
-3	1630850-6	. . . BED, Molecular Sieve (Note 1)	1	
-4	1630850-5	. . . BED, Molecular Sieve (Note 1)	1	
-5	1631086-1	. . STRAP, Hangar	1	
		(ATTACHING PARTS)		
-6	NAS1351C3-6	. . SCREW, Cap Socket	1	
-7	MS35338-138	. . WASHER, Lock	2	
	MS35338-157	. . WASHER, Lock (Alternate)	2	
		---*---		
-8	AN742D2	. . CLAMP, Loop	1	
		(ATTACHING PARTS)		
-9	NAS1351C3-4	. . SCREW, Cap Socket	1	
		---*---		
-10	1602321-51	. . PACKING, Preformed	1	
-11	1602321-51	. . PACKING, Preformed	1	
-12	1631085-1	. . L-BRACKET	1	
		(ATTACHING PARTS)		
-13	MS51958-62	. . SCREW	2	
		---*---		
-14	1630835-1	. . PLENUM ASSEMBLY	1	
-15	1602321-5	. . . PACKING, Preformed	2	
-16	1602321-5	. . . PACKING, Preformed	2	
-17	1602321-73	. . . PACKING, Preformed	2	
-18	1632137-1	. . . CHECK VALVE ASSEMBLY	2	
		(ATTACHING PARTS)		
-19	MS51957-17	. . . SCREW	5	
-20	MS35333-70	. . . WASHER, Lock	5	
		---*---		
-21	1630839-1	. . CLIP, Connector Lock	2	
-22	1630838-1	. . CONNECTOR, Plenum Sleeve	2	

Notes: 1. Index number 3, P/N 1630850-6, and index number 4, P/N 1630850-5, can no longer be ordered individually; these parts must now be ordered as a set under P/N 1601373-1, NSN 1680-01-511-3170.

NUMERICAL INDEX

Part Number	Figure and Index No.	SM&R Code
AN742D2	4-28-8	PAGZZ
AN742D3	4-25-30	PAGZZ
AN816-5J	4-25-35	PAGZZ
AN960C10L	4-24-5	PAGZZ
	4-25-27	PAGZZ
	4-25-28	PAGZZ
AS3582-012	4-27-18	PAGZZ
AS3582-016	4-26-8	PAGZZ
MS21043-5	4-24-11	PAGZZ
MS28775-016	4-26-8	PAGZZ
MS3102R18-9P	4-25-22	
MS3367-2-9	4-26-7	PAGZZ
MS35265-13	4-26-11	PAGZZ
MS35333-70	4-28-20	PAGZZ
MS35338-135	4-25-24	PAGZZ
	4-26-3	PAGZZ
MS35338-137	4-25-8	PAGZZ
MS35338-138	4-24-7	PAGZZ
	4-25-18	PAGZZ
	4-26-5	PAGZZ
	4-28-7	PAGZZ
MS35338-154	4-26-3	PAGZZ
MS35338-156	4-25-8	PAGZZ
MS35338-157	4-24-7	PAGZZ
	4-25-24	PAGZZ
	4-26-5	PAGZZ
	4-28-7	PAGZZ
MS51957-17	4-28-19	PAGZZ
MS51957-45	4-25-7	PAGZZ
MS51957-63	4-26-4	PAGZZ
MS51957-66	4-26-6	PAGZZ
MS51958-60	4-24-6	PAGZZ
	4-25-19	PAGZZ
MS51958-62	4-28-13	PAGZZ
MS51959-46	4-24-3	PAGZZ
MS51959-73	4-24-9	PAGZZ
MS51960-100	4-25-6	PAGZZ
MS51960-65	4-25-3	PAGZZ
MS51960-67	4-25-2	PAGZZ
MS51960-69	4-25-4	PAGZZ
MS51960-84	4-24-2	PAGZZ
MS90376-14R	4-27-5	PAGZZ
MS9068-012	4-27-18	PAGZZ
NAS1351C3-4	4-28-9	PAGZZ
NAS1351C3-5	4-25-21	PAGZZ
NAS1351C3-6	4-28-6	PAGZZ
NAS1351C3-8	4-25-26	PAGZZ
NAS1352C04-5	4-25-23	PAGZZ
	4-26-2	PAGZZ
NAS620C10L	4-24-8	PAGZZ
100-25-DX	4-27-15	
1601373-1	4-28	PAOGD
1602321-5	4-26-8	PAGZZ
	4-27-17	PAGZZ

Part Number	Figure and Index No.	SM&R Code
	4-28-15	PAGZZ
	4-28-16	PAGZZ
1602321-51	4-28-10	PAGZZ
	4-28-11	PAGZZ
1602321-73	4-28-17	PAGZZ
1603660-262	4-24-12	PAGZZ
	4-25-10	PAGZZ
1619531-1	4-25-34	PAGZZ
1630830-1	4-26-9	PAGDD
1630835-1	4-28-14	PAGZZ
1630838-1	4-28-22	PAGZZ
1630839-1	4-28-21	PAGZZ
1630840-1	4-26-1	PAGZZ
1630850-5	4-28-4	XAGDD
1630850-6	4-28-3	XAGDD
1630853-1	4-25-20	PAGZZ
1630869-1	4-26-10	
1630985-3	4-25-1	PAGZZ
1630992-1	4-24-15	PAGZZ
1630995-1	4-25-29	PAGZZ
1631000-1	4-24	PAGZZ
	4-25	
	4-26	
	4-27	
	4-28	
1631040-1	4-27-1	PAGZZ
1631048-1	4-27-8	PAGZZ
1631049-1	4-27-16	PAGZZ
1631074-1	4-27-10	PAGZZ
1631075-2	4-27-14	PAGZZ
1631076-1	4-27-22	XBGZZ
1631077-2	4-27-12	PAGZZ
1631079-2	4-27-9	PAGZZ
1631081-1	4-27-7	PAGZZ
1631082-1	4-27-21	XBGZZ
1631085-1	4-28-12	PAGZZ
1631086-1	4-28-5	PAGZZ
1631087-1	4-25-9	PAGZZ
1631087-4	4-25-11	PAGZZ
1631154-1	4-25-17	PAGZZ
1631160-1	4-25-31	PAGZZ
1631161-1	4-25-32	PAGZZ
1631163-1	4-24-14	PAGZZ
1631167-1	4-27-2	PAGZZ
1631321-5	4-27-4	PAGZZ
1631372-1	4-28-1	PAGDD
1631546-1	4-24-10	PAGZZ
1631547-1	4-24-4	PAGZZ
1631550-1	4-24-1	PAGZZ
1631886-1	4-24-13	PAGZZ
1631919-2	4-27-11	PAGZZ
1632111-1	4-25-25	PAGZZ
1632137-1	4-28-18	PAGZZ

NUMERICAL INDEX (Cont)

Part Number	Figure and Index No.	SM&R Code
1632185-1	4-27-13	PAGZZ
1632225-1	4-25-12	PAGZZ
1632225-2	4-25-14	PAGZZ
1632226-1	4-25-13	PAGZZ
1632227-1	4-25-16	PAGZZ
1632234-1	4-25-15	PAGZZ
1632344-1	4-25-5	PAGZZ
1632410-1	4-27-3	PAGZZ
1643231-1	4-27-15	PAGZZ
1644246-1	4-28-2	PAGZZ
1646811-3	4-27-20	PAGZZ

Part Number	Figure and Index No.	SM&R Code
1647003-1	4-25-33	PAGZZ
1653300-1	4-27-19	PAGZZ
1657476-1	4-27-6	PAGGG
3261009-0105	4-24	PAGGG
	4-25	
	4-26	
	4-27	
	4-28	
56040-94-4	4-26-11	PAGZZ
812787-9	4-25-36	PAGZZ

CHAPTER 5

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CHAPTER 6

OEAS OXYGEN CONCENTRATOR

TYPE GGU-12/A, P/N 3261077-0101

EFFECTIVITY: THIS CHAPTER IS TO BE USED ONLY WHEN USING MODIFIED TEST SET, TTU-518A/E

Section 6-1. Description

6-1. GENERAL.

6-2. The Oxygen Enriched Air System (OEAS) GGU-12/A Oxygen Concentrator, Type GGU-12/A, P/N 3261077-0101 (figure 6-1), is manufactured by Litton Life Support, formerly Clifton Precision (CAGE 99251). The concentrator is designed to provide a supply of breathing oxygen for two aircrewmembers' open loop breathing schedules up to 50,000 feet. Table 6-1 contains the leading particulars for the GGU-12/A oxygen concentrator.

6-3. CONFIGURATION.

6-4. The GGU-12/A oxygen concentrator consists of an air heater assembly, inlet filter assembly, pressure reducer assembly, rotary valve assembly, two molecular sieve beds, a plenum assembly, a thermal resistor, a junction box assembly, a thermostatic switch, and a shroud.

6-5. FUNCTION.

6-6. The GGU-12/A oxygen concentrator uses engine bleed air and electrical power from the aircraft and provides oxygen-enriched air for aircrewmember breathing. The compressed air enters the concentrator through an air heater (1) (figure 6-2) and then passes through an inlet filter (2). The supply air pressure is reduced through the pressure reducer assembly (3) to conserve air when inlet pressure is greater than required. The supply air is then routed to the motor-driven rotary valve (4) which sequentially ports the air to the molecular sieve beds (5). The two sieve beds operate as an alternating pair due to the design of the rotary valve. When one bed is pressurized, and producing oxygen while adsorbing nitrogen, the other is venting to ambient and desorbing nitrogen from the prior pressurization cycle.

6-7. The regeneration by desorption of nitrogen in the vented bed is enhanced by a reverse flow of oxygen-enriched gas from the output or product end of the pressurized bed. The amount of the reverse purge flow through the vented bed is controlled by the purge orifice connecting the output ends of the two beds. The two beds are cycled alternately between pressurization or oxygen producing mode and the vented, regenerative mode by the motor driven rotary valve. The output oxygen-enriched product gas from the pressurized bed flows into the plenum assembly (6) and through check valves at the outlet of each sieve bed preventing backflow.

6-8. The oxygen-enriched product gas from the concentrator flows through a filter and then to the aircrew breathing system.

6-9. A thermal resistor (7) senses inlet air temperature and controls heater operation, while a thermostatic switch (8) turns off the inlet air heater when the heater case temperature exceeds the overtemperature limit. A manual reset overtemperature indicator displays an overtemperature condition.

6-10. Electronic components for control of the inlet air heater and the rotary valve motor are contained within the junction box assembly (9).

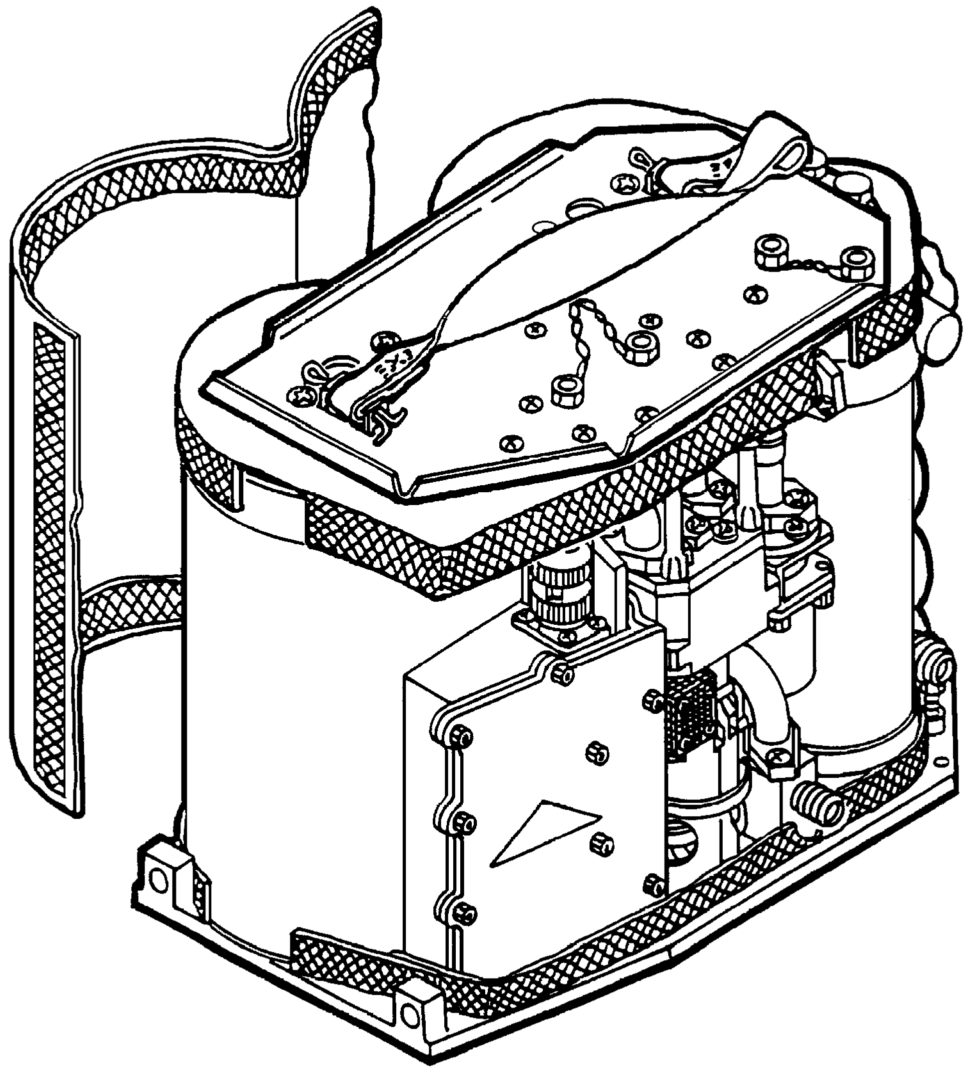


Figure 6-1. GGU-12/A Oxygen Concentrator, P/N 3261077-0101 (shown with shroud removed)

Table 6-1. Leading Particulars

Type GGU-12/A	P/N 3261077-0101
Mounting	2 index pins, 2 captive fasteners used for aircraft mounting
Voltage	115 Vac, 400 Hz, 6 amps (max)
Heater	1 unit with air heater overtemperature indicator
Filter	0.6 Micron
Inlet Pressure Range	8 to 250 psig, 50 psig preferred
Pressure Reducer	Cut in at 50 psig inlet pressure and increases to 85 ± 5 psig at 250 psig inlet pressure
Relief Valve	125 psig outlet pressure
Rotary Valve	6.35 RPM (continuous rotation)
Sieve Beds	Two unit, molecular type
Plenum	Oxygen enriched air storage
Junction Box	Power supply for heater and rotary valve
Operating Altitude Range	Sea level to 50,000 feet
Operating Temperature	-65° to +165°F
Overall Dimensions:	
Length:	13 3/4 inches
Width	8 2/3 inches
Height	10 1/3 inches
Weight	37.5 lbs.

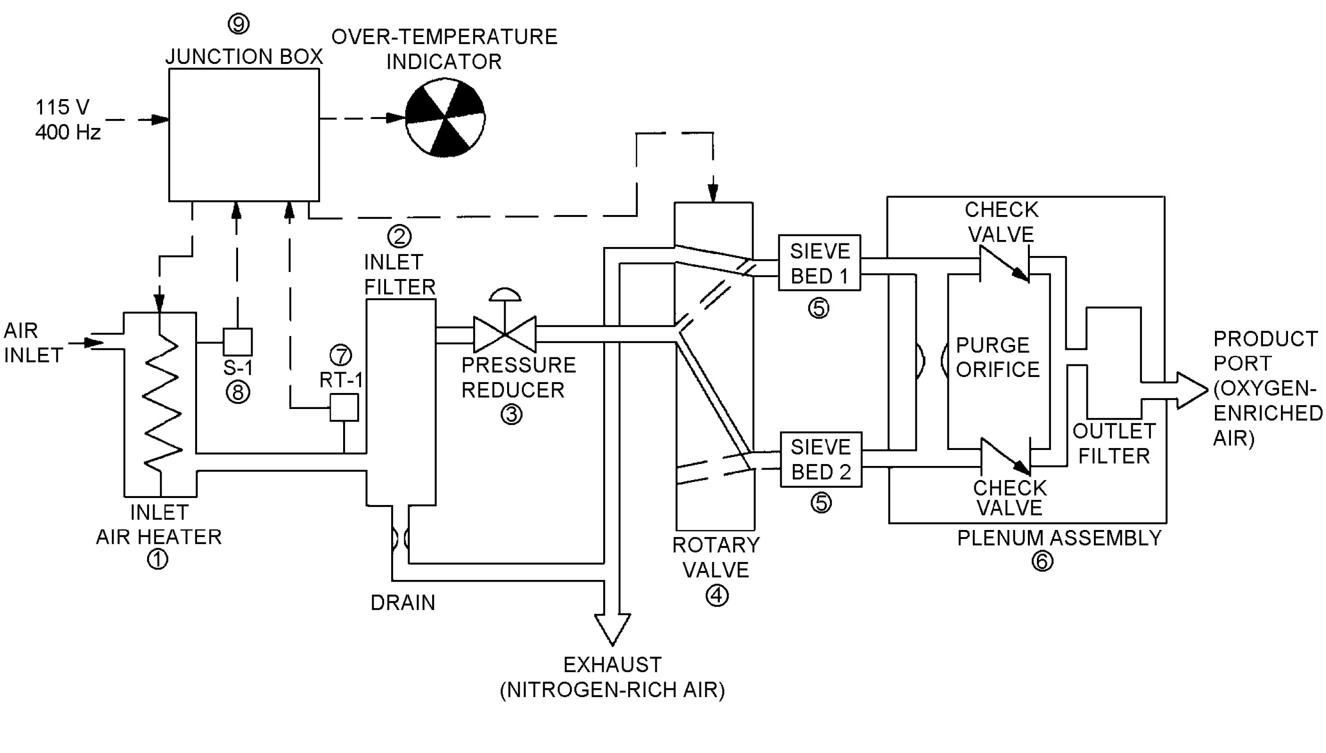


Figure 6-2. GGU-12/A Oxygen Concentrator Schematic

Section 6-2. Modifications

6-11. GENERAL.

6-12. There are no modifications to the GGU-12/A concentrator required/authorized at this time.

Section 6-3. Performance Test Sheet Preparation

6-13. GENERAL.

6-14. A Performance Test Sheet shall be prepared as shown in figure 6-4 or figure 6-5 (with OBOGS adapter) and shall be used to record test results. The Performance Test Sheets shown are samples, but may be reproduced for local use.

Section 6-4. Maintenance

6-15. GENERAL.

6-16. This section contains the procedural steps for inspection and testing of the GGU-12/A oxygen concentrator.

6-17. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and in the sequence in which they normally occur.

NOTE

Upon completion of any maintenance action (inspection or testing) be sure to complete the necessary entries on appropriate forms in accordance with OPNAVINST 4790.2 Series.

6-18. Prior to testing or maintenance of GGU-12/A oxygen concentrator, it is necessary to determine whether or not the unit has the -2 configuration of the inlet filter assembly. The -2 configuration of this assembly provides improved moisture and fluid drainage at the inlet filter, preventing possible oxygen degradation and elimination of corrosion effects. This effects units without a serial number prefix of RHZ or SEU or units with a serial number prefix of RHZ 339 or below. To determine whether or not the inlet filter assembly on these units has been modified, inspect for the following:

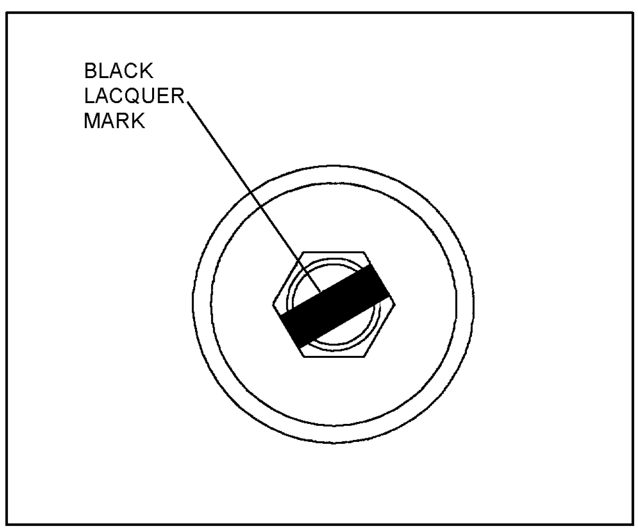


Figure 6-3. Black Lacquer Marking on Special Bolt

a. Inlet filter assembly (14, figure 6-11) is marked with P/N 1647710-1. After it has been modified, the P/N becomes 1647710-2.

b. Filter post special screw is not marked with black lacquer. After it has been modified, it will be marked as shown in figure 6-3.

NOTE

If you have determined that modification is required, perform the procedure in conjunction with the Replacement of Inlet Filter Tube Element, paragraph 6-89.

6-19. INSPECTIONS.

6-20. GGU-12/A oxygen concentrators which do not pass inspection and cannot be adjusted in the aircraft shall be removed and replaced with a Ready-For-Installation (RFI) GGU-12/A oxygen concentrator. The replaced oxygen concentrator shall be forwarded to AIMD/MALS for Bench Test and Repair.

6-21. TURNAROUND/PREFLIGHT/POSTFLIGHT/TRANSFER INSPECTIONS. The Turnaround/Preflight/Postflight/Transfer Inspections are performed in conjunction with the aircraft inspection requirements for the aircraft in which the GGU-12/A oxygen concentrator is installed.

6-22. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the GGU-12/A oxygen concentrator is installed using applicable aircraft technical publications and maintenance requirement cards.

6-23. CALENDAR/PHASED/SDLM INSPECTIONS. The Calendar/Phased/SDLM Inspections require removal of the GGU-12/A oxygen concentrator from the aircraft. See applicable planned maintenance system (PMS) publications for specified intervals. In no case shall the interval exceed 400 flight hours. Upon removal from the aircraft, the concentrator shall be forwarded to AIMD/MALS for Inspection and Bench Test.

6-24. VISUAL INSPECTION. To perform a Visual Inspection of the GGU-12/A oxygen concentrator, proceed as follows:

1. Inspect the GGU-12/A oxygen concentrator overtemperature indicator for fault indication. Record on the Performance Test Sheet. If fault was indicated, reset overtemperature indicator after recording fault on data sheet.

2. Inspect the GGU-12/A oxygen concentrator for dents, corrosion, dirt, contamination, and other obvious damage. Correct as necessary.

3. Inspect electrical connections and wiring for good connection, breaks in wires, corrosion, and bent or missing pins. Correct as necessary.

4. Inspect all welded points for security of attachment and breaks in welding. Correct as necessary.

5. Inspect shroud assembly for cuts, tears, and hole punctures (except at exit locations and interface ports). Correct as necessary.

6. Inspect all external screws, nuts, and fittings for good condition. Correct as necessary.

7. Inspect nameplate for legibility, security of attachment, and good condition. Correct as necessary.

GGU-12/A CONCENTRATOR PERFORMANCE TEST SHEET

P/N 3261077-0101

DATE ______________________ CONCENTRATOR SERIAL NO. ______________________

TEST STAND SERIAL NO. ______________________ TEST STAND OPERATOR ______________________

CDI ______________________

1. CHECK OVERTEMPERATURE INDICATOR ON CONCENTRATOR:
   NO FAULT INDICATED ______________ (√) FAULT INDICATED/RESET ______________ (√)

2. 115V MOTOR HEATER CURRENT TEST - CONC ON SWITCH (S1) IS ON:
   CHECK IF 115V HEATER LAMP (DS6) ILLUMINATES AND THEN EXTINGUISHES ______________ (√)

   RECORD 115V NO LOAD MOTOR METER (M2) READING ______________ (.4 AMPS MAXIMUM).

   RECORD 115V MOTOR METER (M2) READING ______________

   RECORD FINAL 115V MOTOR METER (M2) READING ______________ (.45 AMPS MAXIMUM).

3. 115V MOTOR VALVE RPM TEST
   NUMBER OF PRESSURE DROPS DURING TWO MINUTE PERIOD ______________ (23 TO 27 DROPS)

4. PRESSURE REDUCER TEST
   READ AIR-OXY PRESSURE GAGE (G1) ______________ (47.5 TO 54 PSIG)

5. INTERNAL LEAKAGE TEST
   INITIAL READING AIR-OXY PRESSURE GAGE (G1) ______________

   G1 READING AFTER 1 MINUTE ______________ (3 PSIG MAX. DECREASE)

   G1 READING AFTER 5 MINUTES ______________ (15 PSIG MAX. DECREASE)

6. OXYGEN FLOW TEST/FILTER DRAIN FLOW TEST

   FILTER DRAIN FLOW TEST: YES ______________ (√)

SET AIR-OXY PRESSURE GAGE (G1) TO 15 PSIG

V2 SETTING	G3 ALLOWED (PSIG)	G3 READING	G1 ALLOWED (PSIG)	G1 READING	M3 ALLOWED (%)	M3 READING
HIGH	85 TO 120		4 TO 15		25	
MEDIUM	85 TO 120		4.5 TO 15		35	
LOW	85 TO 120		5 TO 15		56	

SET AIR-OXY PRESSURE GAGE (G1) TO 50 PSIG

V2 SETTING	G3 ALLOWED (PSIG)	G3 READING	G1 ALLOWED (PSIG)	G1 READING	M3 ALLOWED (%)	M3 READING
HIGH	85 TO 120		13 TO 50		58.5	
MEDIUM	85 TO 120		14 TO 50		79.5	
LOW	85 TO 120		18 TO 50		93	

Figure 6-4. Performance Test Sheet

GGU-12/A CONCENTRATOR (P/N 3261077-0101)
PERFORMANCE TEST SHEET UTILIZING OBOGS ADAPTER
ASSEMBLY (P/N 3248AS100-1)

DATE ______________ CONCENTRATOR SERIAL NO. ______________

TEST STAND SERIAL NO. ______________ TEST STAND OPERATOR ______________

CDI ______________

1. CHECK OVERTEMPERATURE INDICATOR ON CONCENTRATOR:
   NO FAULT INDICATED ______________ (√) FAULT INDICATED/RESET ______________ (√)

2. 115V MOTOR HEATER CURRENT TEST - CONC ON SWITCH (S1) IS ON:
   CHECK IF 115V HEATER LAMP (DS6) ILLUMINATES AND THEN EXTINGUISHES ______________(√)

   RECORD 115V MOTOR METER (M2) READING ______________ (.45 AMPS MAXIMUM)

3. 115V MOTOR VALVE RPM TEST
   NUMBER OF PRESSURE DROPS DURING TWO MINUTE PERIOD ______________ (23 TO 27 DROPS)

4. PRESSURE REDUCER TEST
   READ AIR-OXY PRESSURE GAGE (G1) ______________ (47.5 TO 54 PSIG)

5. INTERNAL LEAKAGE TEST
   INITIAL READING AIR-OXY PRESSURE GAGE (G1) ______________

   G1 READING AFTER 1 MINUTE ______________ (3 PSIG MAX. DECREASE)

   G1 READING AFTER 5 MINUTES ______________ (15 PSIG MAX. DECREASE)

6. OXYGEN FLOW TEST/FILTER DRAIN FLOW TEST

   FILTER DRAIN FLOW TEST: YES ______________ (√)

SET AIR-OXY PRESSURE GAGE (G1) TO 15 PSIG

V2 SETTING	G3 ALLOWED (PSIG)	G3 READING	G1 ALLOWED (PSIG)	G1 READING	M3 ALLOWED (%)	M3 READING
HIGH	75 TO 120		4 TO 15		25	
MEDIUM	75 TO 120		4.5 TO 15		35	
LOW	75 TO 120		5 TO 15		56	

SET AIR-OXY PRESSURE GAGE (G1) TO 50 PSIG

V2 SETTING	G3 ALLOWED (PSIG)	G3 READING	G1 ALLOWED (PSIG)	G1 READING	M3 ALLOWED (%)	M3 READING
HIGH	75 TO 120		13 TO 50		58.5	
MEDIUM	75 TO 120		14 TO 50		79.5	
LOW	75 TO 120		18 TO 50		93	

Figure 6-5. Performance Test Sheet (Wtih OBOGS Adapter)

6-25. BENCH TEST.

WARNING

When working with oxygen, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

CAUTION

Check the overtemperature indicator on the GGU-12/A concentrator. If a fault is indicated, record fault (paragraph 6-24, step 1) and reset overtemperature indicator. When GGU-12/A concentrator is attached to the P/N 1779AS500-2 test set, take note of the 115 V HEATER lamp (DS6) when CONC ON switch (S1) is turned ON. If DS6 illuminates and does not extinguish within 30 seconds, this indicates overheating of the concentrator and further testing could result in damage to the unit.

NOTE

When performing Bench Test, use the Performance Test Sheet (figure 6-4 or figure 6-5) for recording readings and indications as they apply. Read the entire step before beginning to familiarize yourself with what needs to be recorded for that step.

Tests are arranged so they proceed from one test to the next with a minimum of change of connections and valve positioning.

GGU-12/A oxygen concentrators failing the bench test shall be repaired. The aviation life support systems division shall replace all defective component parts and make necessary adjustments to the oxygen concentrator.

6-26. Bench Test shall be performed on the GGU-12/A oxygen concentrator prior to being placed in service and every 400 flight hours when inlet filter tube element is replaced. The inlet filter tube element shall be replaced every time the oxygen concentrator is serviced prior to any testing or repair. The oxygen concentrator shall also be subjected to Bench Test if malfunction is suspected, and after repair or replacement of malfunctioning or damaged parts.

6-27. The Bench Test shall be performed using the Oxygen Concentrator Test Set, Model TTU-518A/E (P/N 1779AS500-2) only (paragraph 6-31) or the Test Set utilizing that OBOGS adapter (paragraph 6-39). Refer to appropriate ground support equipment manual for identification of test set controls and indicators referred to in Bench Test.

6-28. Due to complexity of the model TTU-518A/E test set, it is essential the operator become thoroughly familiar with test set prior to performing the Bench Test. Refer to appropriate ground support equipment manual.

6-29. Unless otherwise specified in a specific test, the pressure applied and valve positioning shall remain unchanged.

6-30. TEST SET MONITOR TEST. In order to prevent unnecessary replacement of concentrator sieve beds, the Test Set Monitor Test is performed only if the concentrator fails the Oxygen Flow Test/Filter Drain Flow Test (paragraph 6-37 or paragraph 6-44). To perform the Test Set Monitor Test, refer to the appropriate support equipment technical manual.

6-31. BENCH TEST USING TEST SET TTU-512A/E ONLY.

6-32. Test Set Setup and Display Lamp Test. To set up the test set and check out its display lamps, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Tubing, Plastic	CHEMFLUORAX-H00002

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly, Outlet	1779AS522-1
1	Adapter Assembly, Exhaust	1779AS524-1
1	Cable Assembly, Concentrator	1779AS516-1
1	Cable Assembly, Power Supply	1779AS180-1

Support Equipment Required (Cont)

Quantity	Description	Reference Number
1	Cable Assembly, Power Supply	1779AS517-1
1	Concentrator Test Set, Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Hose Assembly, Inlet	1779AS133-1
1	Hose Assembly, Outlet	1779AS134-1
1	Hose Assembly, Oxygen	5SE01859-1
1	Muffler Assembly	1779AS578-1
1	Tube Pliers, Inlet Filter Drain	3309311-1 (CAGE 99251)

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings tools, and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc.) and any other combustible materials. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

CAUTION

Do not lift or carry the GGU-12/A oxygen concentrator by the exhaust vent metallic tube assembly or the rotary valve assembly. Damage to the GGU-12/A oxygen concentrator will occur.

1. Ensure test set lid is removed and circuit breaker INSTM ON (CB3) is in the RESET position (pushed in).

2. Ensure circuit breakers 28 VDC ON (CB1), 115 VAC ON (CB2) and switch CONC ON (S1) are OFF.

3. Turn PRESSURE SELECT valve (V1) to the AIR TO CONC position.

4. Turn FLOW SELECT valve (V2) to LOW position.

NOTE

OXY ANALYZER (V3) and CONC FLOW (V4) are toggle valves. They are closed when the black handle is parallel to the panel assembly. They are open when the black handle is perpendicular to the panel assembly.

5. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are in the CLOSED position.

6. Ensure adjusting knob of AIR PRESSURE CONTROL (RG1) is turned counterclockwise four turns or until spring tension is released.

7. Ensure adjusting knob of FLOW PRESSURE CONTROL (RG2) is turned counterclockwise four turns or until spring tension is released.

8. Ensure test set panel vent next to FLOW PRESSURE gage (G2) is clean and free of any foreign material.

9. Remove all hoses, cables, adapters, muffler, and filter from lid of concentrator test set.

10. Remove protective shipping covers from the GGU-12/A concentrator cable assembly.

11. Remove cap assembly from 115 V CONC POWER (J13) on test set.

12. Connect one end of GGU-12/A concentrator cable assembly to 115 V CONC POWER (J13) and the other end to concentrator.

13. Remove cap assemblies from AIR TO CONC (J4) and OXY FROM CONC (J3).

14. Remove protective shipping caps and connect one end of concentrator outlet hose assembly to the GGU-12/A concentrator outlet adapter assembly. Connect this assembly to OXY FROM CONC (J3). Connect other end of concentrator outlet hose to oxygen concentrator outlet port.

15. Remove protective shipping plugs and connect one end of concentrator inlet hose assembly to AIR TO CONC (J4). Connect other end of concentrator inlet hose to the GGU-12/A oxygen concentrator inlet port.

CAUTION

Do not restrict exhaust flow from concentrator by any other means than muffler assembly.

16. Remove protective shipping cover from muffler assembly.

17. Connect the muffler assembly to GGU-12/A exhaust adapter assembly. Remove protective shipping cap and connect this assembly to GGU-12/A oxygen concentrator exhaust port.

18. Remove protective shipping cap from the OXY EXHAUST (J5) on concentrator test set.

19. Remove protective shipping caps (P/N 1779AS518-1) from inlet filter assembly.

20. Remove cap assembly from FILTER PORT (J1) and connect inlet filter assembly to FILTER PORT (J1).

21. Connect inlet filter assembly to a source of clean, dry air that is regulated to 90 to 120 psig and is capable of supplying 26 SCFM, using oxygen hose assembly with reducer. Turn on shop air supply. Pressure is indicated on INLET PRESSURE (G3) on test set. At no time during operation shall G3 fall below 85 psig.

22. Remove cap assemblies from 28 Vdc connector (J10) and 115 Vac connector (J12).

CAUTION

Do not connect 28 Vdc return and case ground together. Allow 28 Vdc to float.

23. Connect 28 V power cable assembly (P/N 1779AS180-1) to 28 Vdc connector (J10) and a 28 Vdc power supply. The connector on power supply end of cable is an MS3106A16-11P. Pin B is +28 Vdc (positive) and Pin A is return (negative). The connector shell is case ground.

24. Turn on power supply.

WARNING

Hazardous voltages may be present on case of the test set if power plug and source are not connected to safety ground (green wire).

25. Connect 115 V power cable assembly (P/N 1779AS517-1) from 115 Vac connector (J12) to a locally available mating power plug (rated at 6 amps) and connect to a 115 Vac 400 Hz, 6 amp minimum power source. The black wire is high, white is low and green is safety ground.

NOTE

% OXYGEN Meter (M3) will initially read 0.5% and should stabilize at approximately 21 ±2% within 5 minutes.

26. Set 28 VDC ON circuit breaker (CB1) to ON. DS1 lamp and M3 meter will illuminate. RG4 HEATER lamp (DS3) will illuminate momentarily and then extinguish to indicate the monitor is operating within temperature limits.

27. Set 115 VAC ON circuit breaker (CB2) to ON. DS2 lamp will illuminate.

28. Push and release PUSH TO TEST DISPLAY button (S2). RG4 Heater lamp (DS3), 28 V HEATER NO. 1 lamp (DS4), 28 V HEATER NO. 2 lamp (DS5), and 115 V HEATER lamp (DS6) shall illuminate and extinguish when S2 is released.

29. Leave all connections and valves unchanged and proceed to next test.

6-33. 115 V Motor Heater Current Test. To perform the 115 V Motor Heater Current Test, proceed as follows:

CAUTION

CONC ON switch (S1) power and RG1 pressure should be applied as close together as possible. Damage to the concentrator may occur if RG1 pressure is applied to concentrator prior to energizing rotary valve motor. The rotary valve motor should not be energized for extended periods without air pressure applied to concentrator.

NOTE

Ensure motor meters M1 and M2 are indicating zero; if the test set was calibrated in the vertical position and your test is in the horizontal position, chances are M1 and M2 are not indicating zero. The test set must be positioned as it was calibrated.

1. Disconnect GGU-12/A Concentrator Cable Assembly from 115V CONC POWER (J13) of test set.

2. Turn CONC ON SWITCH (S1) to ON and record 115V NO LOAD reading from motor meter (M2) on Performance Test Sheet.

3. Turn CONC ON SWITCH (S1) to OFF and reconnect GGU-12/A Concentrator Cable Assembly to 115V CONC POWER (J13) of test set.

4. Set CONC ON SWITCH to ON and adjust air pressure control (RG1) until air-oxy pressure gage (G1) reads 50 psig. 115V HEATER LAMP (DS6) will illuminate and then extinguish. Ensure audible operation of concentrator rotary valve.

5. Observe 115V MOTOR METER (M2) and record reading on Performance Test Sheet.

6. Subtract 115V NO LOAD MOTOR METER (M2) reading from step 5 above and record the reminder on Performance Test Sheet as FINAL 115V MOTOR METER (M2) reading. FINAL 115V MOTOR METER (M2) reading shall not exceed 0.45 amps maximum.

7. Leave all connections and valves unchanged and proceed to next test.

6-34. 115 V Motor Valve RPM Test. To perform the Motor Valve RPM Test, proceed as follows:

NOTE

When performing steps 1 and 2, the motor valve rotates at 6.35 RPM. There are two sudden rapid drops in pressure displayed on AIR-OXY PRESSURE gage (G1), followed by a return to normal pressure per revolution. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to concentrator exhaust port.

1. Count the number of pressure drops that occur during a two-minute period. The number of pressure drops shall be 23 to 27. Record number of pressure drops on Performance Test Sheet.

2. Leave all connections and valves unchanged and proceed to next test.

6-35. Pressure Reducer Test. To perform the Pressure Reducer Test, proceed as follows:

1. Turn CONC FLOW valve (V4) to OPEN.

2. Slowly adjust FLOW PRESSURE CONTROL valve (RG2) until FLOW PRESSURE gage (G2) indicates 30 inH_2O on the high pressure swing.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until AIR-OXY PRESSURE gage (G1) indicates 70 psig on the high pressure swing.

4. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position. AIR-OXY PRESSURE gage (G1) should indicate 47.5 to 54 psig during high pressure swing. Record reading from AIR-OXY PRESSURE gage (G1) on Performance Test Sheet.

5. If reading is within tolerance, leave all connections and valves unchanged and proceed to next test.

6-36. Internal Leakage Test. To perform the Internal Leakage Test, proceed as follows:

1. Turn CONC FLOW valve (V4) to CLOSED.

2. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

3. Adjust AIR PRESSURE CONTROL valve (RG1) until 5 psig is indicated on AIR-OXY PRESSURE gage (G1) at the high pressure swing.

4. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position.

5. Record initial reading from AIR-OXY PRESSURE gage (G1) and then wait for one minute; pressure drop shall not exceed 3 psig. Record 1-minute reading on Performance Test Sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop after 5 minutes shall not exceed 15 psig. Record 5-minute reading on Performance Test Sheet.

6. Set CONC FLOW valve (V4) to OPEN position.

7. If final reading for Internal Leakage Test is within tolerance, leave all connections and valves unchanged and proceed to the next test.

6-37. Oxygen Flow Test/Filter Drain Flow Test. To perform the Oxygen Flow Test/Filter Drain Test, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

When taking reading from AIR-OXY PRESSURE gage (G1), there will be a pressure swing; record both the low and high pressure indications on the Performance Test Sheet.

While performing the Oxygen Flow Test, ensure that while concentrator is operating (CONC ON switch (S1) to ON) that the reading on INLET PRESSURE gage (G3) does not fall below 85 psig. If pressure reading does fall below 85 psig, air supply or filter assembly is inadequate and does not meet specified requirements.

1. Using Inlet Filter Drain Tube Pliers, remove filter drain hose (1, figure 6-6) from outlet adapter (2).

2. Verify air is bleeding through drain hose (1).

3. Verify air is not leaking from filter inlet assembly.

4. Using Inlet Filter Drain Tube Pliers, install filter drain hose onto outlet adapter.

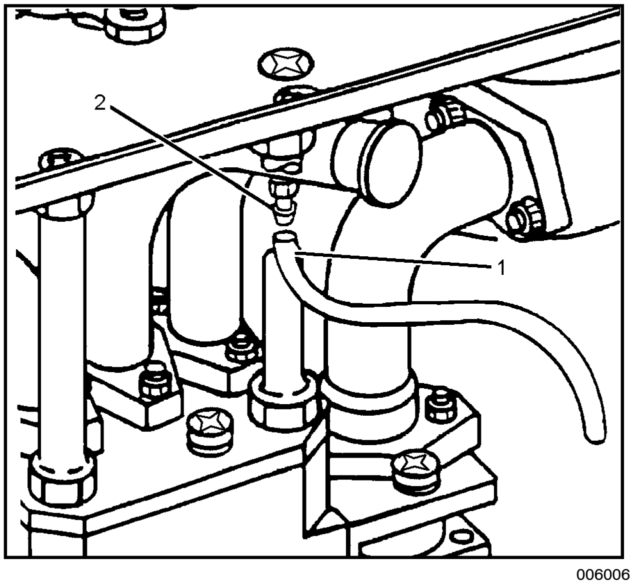


Figure 6-6. Filter Drain Hose

NOTE

If filter drain hose requires replacement when performing step 5, use plastic tubing, available from:

Read Plastics
12331 Wilkins Ave.
Rockville, MD 20852
Tel: (301) 881-7900
(Minimum order 50 feet required)

5. If drain hose is not clogged, place check mark in appropriate space on Performance Test Sheet. If hose is clogged, refer to troubleshooting (table 6-8).

6. Turn FLOW SELECT valve (V2) to HIGH position and PRESSURE SELECT valve (V1) to the AIR TO CONC position. Ensure OXY ANALYZER (V3) valve is in OPEN position.

7. Adjust AIR PRESSURE CONTROL valve (RG1) until 15 psig at high pressure swing is indicated on AIR-OXY PRESSURE gage (G1).

8. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and adjust AIR PRESSURE CONTROL valve (RG1) until 15 psig at high pressure swing is indicated on AIR-OXY PRESSURE gage (G1).

9. Read INLET PRESSURE gage (G3) and record high/low pressure reading on Performance Test Sheet. The reading should not fall below 85 psig.

10. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inH_2O at high pressure swing is indicated on FLOW PRESSURE gage (G2).

11. Maintain 30 inH_2O (at high pressure swing) as indicated on FLOW PRESSURE gage (G2). Allow reading on % OXYGEN meter (M3) to stabilize for up to 15 minutes.

NOTE

If concentrator fails Oxygen Flow Test, ensure that the test set monitor is working properly. Refer to paragraph 6-30 for test set monitor test.

12. Record high/low pressure readings from AIR-OXY PRESSURE gage (G1) and % OXYGEN meter (M3) on Performance Test Sheet. Readings shall meet the requirement listed on the Performance Test Sheet.

13. Turn FLOW SELECT valve (V2) to MED position and repeat steps 7 through 12.

14. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 7 through 12.

15. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

16. Turn FLOW SELECT valve (V2) to HIGH position.

17. Adjust AIR PRESSURE CONTROL valve (RG1) until 50 psig at high pressure swing is indicated on AIR-OXY PRESSURE gage (G1).

18. Turn PRESSURE SELECT valve (V1) to OXY FROM CONC position and adjust AIR PRESSURE CONTROL valve (RG1) until 50 psig at high pressure swing is indicated on AIR-OXY PRESSURE gage (G1), and repeat steps 9 through 14.

19. If readings are within tolerance, secure test set and concentrator as follows:

20. Back off FLOW PRESSURE CONTROL (RG2) to obtain a zero pressure reading on FLOW PRESSURE gage (G2).

21. Turn PRESSURE SELECT valve (V1) to AIR TO CONC position.

22. Back off AIR PRESSURE CONTROL valve (RG1) to obtain a zero pressure reading on AIR-OXY PRESSURE gage (G1).

23. Set CONC ON switch (S1) to OFF and set CONC FLOW valve (V4) and OXY ANALYZER valve (V3) to CLOSED.

24. Shut off shop air supply and ensure INLET PRESSURE gage (G3) indicates zero psig.

25. Set 28 VDC ON circuit breaker (CB1) and 115 VAC ON circuit breaker (CB2) to OFF. Turn off 28 Vdc power supply and 115 V 400 Hz power source to the test set.

26. Remove 28 Vdc cable assembly from the source of the 28 Vdc power supply and the test set. Install cap assembly onto the 28 Vdc connector (J10).

27. Remove 115 Vac cable assembly from the source of the 115 V, 400 Hz power source and the test set. Install cap assembly onto the 115 Vac connector (J12).

28. Remove hose assembly from filter assembly. Remove filter assembly from FILTER PORT (J1).

29. Remove oxygen outlet hose from the adapter and then remove the adapter from the concentrator.

30. Remove muffler assembly, interconnecting hoses and cables, and adapter assemblies from test set and the GGU-12/A oxygen concentrator.

31. Install protective shipping caps on GGU-12/A oxygen concentrator.

32. Install protective shipping caps on the inlet filter, cable assemblies, adapter assemblies, hose assemblies and muffler assembly and stow in test set lid.

33. Ensure the switches and valves are in the same position as in Test Set Up and Display Lamp Test (paragraph 6-32, steps 1 through 8).

34. Ensure that the test set cap, cover and screw assemblies are installed on their applicable fittings.

35. Place test set lid on test set case. Secure lid to case by using the 8 latches on the lid.

6-38. BENCH TEST USING TEST SET TTU-512A/E AND OBOGS ADAPTER ASSEMBLY P/N 3248AS200-1.

WARNING

To prevent injury to personnel and damage to equipment, make certain when working with oxygen that clothing, work benches, tube fittings, tools and test equipment are free of hydrocarbons (grease, fuel, hydraulic fluid, etc). And any other combustible materials. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

CAUTION

Do not lift or carry the GGU-12/A oxygen concentrator by the exhaust vent metallic tube assembly. Damage to the oxygen concentrator will occur.

NOTE

Paragraphs 6-39 through 6-44 contain the procedural steps for testing of the GGU-12/A concentrator utilizing Model Test Set TTU-518A/E with the OBOGS ADAPTER Assembly part number (3248AS200-1) as a work around test fixture only.

Figure 6-7 will be used for all index numbers throughout this procedure unless otherwise noted.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Tubing, Plastic	CHEMFLUORAX-H00002

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly, Outlet	1779AS522-1
1	Adapter Assembly, Exhaust	1779AS524-1
1	Adapter Assembly, OBOGS	3248AS200-1
1	Cable Assembly, Concentrator	1779AS516-1
1	Cable Assembly, Power Supply	1779AS180-1
1	Cable Assembly, Power Supply	1779AS517-1
1	Concentrator Test Set, Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Hose Assembly, Inlet	1779AS133-1

Support Equipment Required (Cont)

Quantity	Description	Reference Number
1	Hose Assembly, Outlet	1779AS134-1
1	Hose Assembly, Oxygen	5SE01859-1
1	Muffler Assembly	1779AS578-1

6-39. Test Set Setup and Display Lamp Test. To set up the test set and check out its display lamps utilizing the OBOGS Adapter Assembly P/N 3248AS200-1, proceed as follows:

1. Ensure test set lid is removed and circuit breaker INSTM ON (CB3) is in the RESET position (pushed in).

2. Open OBOGS ADAPTER assembly box (7). Remove TTU-518A/E lid from test set.

3. Turn valve (3) to the ON position.

4. Ensure test set circuit breakers 28 VDC ON (CB1), 115 VAC ON (CB2) and switch CONC ON (S1) are OFF.

5. Turn test set PRESSURE SELECT valve (V1) to OXY FROM CONC position.

6. Turn test set FLOW SELECT valve (V2) to LOW position.

NOTE

OXY ANALYZER (V3) and CONC FLOW (V4) are toggle valves. They are closed when the black handle is parallel to the panel assembly. They are open when the black handle is perpendicular to the panel assembly.

7. Ensure OXY ANALYZER (V3) and CONC FLOW (V4) valves are in the closed position.

NOTE

AIR PRESSURE CONTROL valve (RG1) will not be used for testing during this procedure at any time. Ensure valve is secured in accordance with step 8.

8. Ensure that the adjusting knob of AIR PRESSURE CONTROL (RG1) is turned counterclockwise four turns or until spring tension is released.

9. Cap test set FILTER PORT (Jl) and AIR TO CONC (J4) ports.

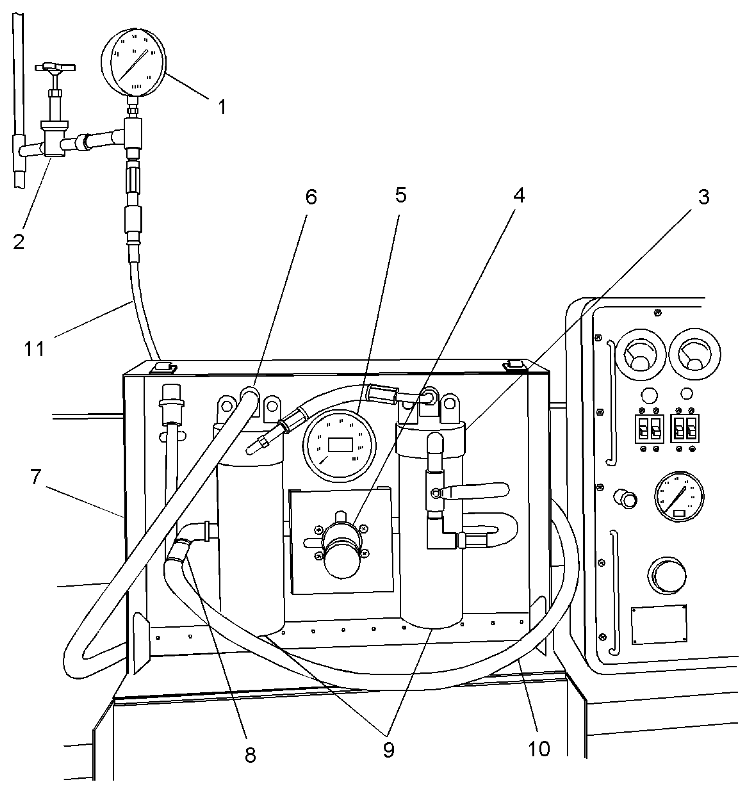


Figure 6-7. OBOGS Adapter Setup

10. Ensure adjusting knob of FLOW PRESSURE CONTROL (RG2) is turned counterclockwise four turns or until spring tension is released.

11. Ensure test set vent next to FLOW PRESSURE gauge (G2) is clean and free of any foreign material.

12. Remove all hoses, cables, adapters and muffler from lid of concentrator test set.

13. Remove protective shipping covers from GGU-12/A concentrator cable assembly (P/N 1779AS516-1).

14. Remove cap assembly from 115V CONC POWER (J13) on test set.

15. Connect one end of concentrator cable assembly (P/N 1779AS516-1) to 115V CONC POWER (J13) and the other end to the concentrator.

16. Remove cap assembly from OXY FROM CONC (J3).

17. Remove protective shipping caps from outlet hose assembly (P/N 1779AS134-1). Connect one end of concentrator outlet hose to the GGU-12/A concentrator outlet adapter assembly (P/N 1779AS522-1). Connect assembly to OXY FROM CONC (J3). Connect the other end of outlet hose assembly to the concentrator outlet port.

18. Remove protective shipping plugs from OBOGS Adapter Assembly Outlet Hose Assembly (10). Connect one end of OBOGS Adapter Assembly Outlet Hose Assembly (10) To OBOGS Adapter Assembly Outlet Port (8). Connect other end of OBOGS Adapter Assembly Outlet Hose (10) to concentrator inlet port.

CAUTION

Do not restrict exhaust flow from concentrator by any other means than the muffler assembly (P/N 1779AS578-1).

19. Remove protective shipping cover from muffler assembly (P/N 1779AS578-1).

20. Connect muffler assembly to GGU-12/A exhaust adapter assembly (P/N 1779AS524-1). Remove protective shipping caps and connect assembly to the GGU-12/A oxygen concentrator exhaust port.

21. Remove protective shipping cap from OXY EXHAUST (JS) on concentrator test set.

NOTE

AIMD intermediate level maintenance shops will require an ON/OFF valve(2) and a 0 to 160 psig gage (1) or suitable substitutes installed on shop air supply source prior to the OBOGS Adapter Assembly Inlet. (Figure 6-7) shall be used for orientation of assembly.

22. Connect OBOGS Adapter Assembly Hose (11) to OBOGS Adapter Assembly INLET Port (6). Connect the other end of OBOGS Adapter Assembly Hose (11) to shop air source.

23. Ensure that the adjusting knob of OBOGS ADAPTER REGULATOR (4) is turned counterclockwise four turns or until spring tension is released.

24. Turn on shop air supply. Pressure will be indicated on Shop Air Supply gage (1). At no time during operation shall Shop Air Supply gage (1) fall below 75 psig during the high-pressure swing.

25. Open OBOGS Adapter Assembly Bleed Ports (9) 1/4 to 1/2 turn until a slight bleed is present.

26. Remove protective shipping caps assemblies from test set 28VDC connector (J10) and 115 VAC connector (J12).

CAUTION

Do not connect 28 VDC return and case ground together. Allow 28 VDC to float.

27. Connect 28 volt power cable assembly (P/N 1779AS180-1) to 28 VDC connector (J10) and to 28 volt DC power supply. Connector on power supply end of cable is (P/N MS3106A16-11P) Pin B is (28 V dc and pin A is return (negative). The connector shell is case ground.

28. Turn on power supply.

WARNING

Hazardous voltages may be present on case of the test set if power plug and source are not connected to safety ground (green wire).

29. Connect 115V power cable assembly (P/N 1779AS517-1) to 115 VAC connector (J12). Connect the other end to a locally available mating power plug (rated at 6 amps) and connect the assembly to a 115 volt ac 400 Hz, 6 amp minimum power source. The black wire is high, the white wire is low and green wire is safety ground.

NOTE

% OXYGEN meter M3 will initially read 0.5% and should stabilize at approximately 20% or higher within 5 minutes.

30. Set 28 VDC ON circuit breaker (CB1) to ON. DS1 lamp and M3 meter will illuminate. RG4 HEATER lamp DS3 will illuminate then extinguish in approximately 3 minutes, indicating the monitor is operating within temperature limits.

31. Set 115 VAC ON circuit breaker (CB2) to ON. DS2 lamp will illuminate.

32. Push and release PUSH TO TEST DISPLAY button (S2). (DS3), (DS4), (DS5) and (DS6) lamps shall illuminate and extinguish and extinguish when S2 is released.

33. Leave all connections and valves unchanged and proceed to concentrator bench test.

6-40. 115V Motor Heater Current Test. To perform the 115V motor heater test, proceed as follows:

CAUTION

CONC ON switch (S1) power and OBOGS Adapter Assembly Pressure should be applied as close together as possible. Damage to the concentrator may occur if pressure is applied to concentrator prior to energizing the rotary valve motor. The rotary valve should not be energized for extended periods without air pressure applied to the concentrator.

1. Set CONC ON switch (S1) to ON and adjust OBOGS ADAPTER PRESSURE CONTROL KNOB (4) until OBOGS ADAPTER PRESSURE Gauge (5) indicates 50 PSIG on the high pressure swing. 115V HEATER lamp (DS6) will illuminate and then extinguish. Ensure audible operation of concentrator rotary valve motor and observe 115V motor meter (M2) for indication (.45 amps maximum). Record results of (DS6) test and (M2) meter reading on Performance Test Sheet.

2. Leave all connections and valves unchanged and proceed to next test.

6-41. 115V Motor Valve RPM Test. To perform the Motor Valve RPM Test proceed as follows:

NOTE

When performing steps 1 and 2, the motor valve rotates at 6.35 RPM. There are two sudden rapid pressure drops in pressure displayed on AIR/OXY PRESSURE gauge (G1), followed by a return to normal pressure per revolution. Each pressure drop can be identified by exhaust air flowing through the muffler assembly attached to concentrator exhaust port.

1. Count the number of pressure drops that occur during the two-minute period. The number of pressure drops shall be 23 to 27. Record number of pressure drops on Performance Test Sheet.

2. Leave all connections and valves unchanged and proceed to next test.

6-42. Pressure Reducer Test. To perform the Pressure Reducer Test, proceed as follows:

1. Turn CONC FLOW valve (V4) to OPEN.

2. Ensure PRESSURE SELECT valve (V1) is set to OXY FROM CONC position.

3. Slowly adjust FLOW PRESSURE CONTROL valve (RG2) until FLOW PRESSURE gage (G2) indicates 30 inches of water on the high-pressure swing.

4. Adjust OBOGS ADAPTER PRESSURE CONTROL KNOB (4) until OBOGS ADAPTER PRESSURE gage (5) indicates 70 psig on the high pressure swing. AIR/OXYGEN PRESSURE gage (G1) should indicate 47.5 to 54 psig during high-pressure swing. Record reading from AIR/OXYGEN PRESSURE gage (Gl) on Performance Test Sheet.

5. If reading is within tolerance, leave all connections and valves unchanged and proceed to internal leakage test.

6-43. Internal Leakage Test. To perform the Internal Leakage Test, proceed as follows:

1. Turn CONC FLOW valve (V4) to CLOSED

2. Adjust OBOGS ADAPTER ASSEMBLY PRESSURE CONTROL knob (4) until 10 psig is indicated on OBOGS ADAPTER PRESSURE gage (5) at the high-pressure swing.

3. Record initial reading from AIR/OXY PRESSURE gage (G1) on Performance Test Sheet and then wait one minute: pressure drop shall not exceed 3 psig. Record 1 minute reading on Performance Test Sheet. If pressure drop exceeds 3 psig, continue test for 5 minutes. Pressure drop after 5 minutes shall not exceed 15 psig. Record 5 minute reading on Performance Test Sheet.

4. If final reading for internal test is within tolerance, leave all connections and valves unchanged and proceed to Oxygen Flow Test.

6-44. Oxygen Flow Test/Filter Drain Flow Test. To perform the Oxygen Flow Test/Filter Drain Test, proceed as follows:

CAUTION

Ensure OXY EXHAUST port (J5) is not blocked.

NOTE

When taking reading from AIR/OXY PRESSURE gage (G1) there will be a pressure swing; record both the low and high-pressure indications on the Performance Test Sheet.

NOTE

While performing the Oxygen Flow Test, ensure that while the concentrator is operating (CONC ON switch (S1) to ON) that the reading on OBOGS ADAPTER INLET gage (11) figure 1, sheet 3 has a peak reading of 75 psig or higher on the high pressure swing. If the pressure reading falls below 75 psig on the high swing, the air supply, concentrator filter assembly or OBOGS Adapter Filter System is inadequate and does not meet the specified requirements.

1. Remove filter drain hose (1, figure 6-6) from outlet adapter (2).

2. Verify air is bleeding through drain hose (1).

3. Verify air is not leaking from filter inlet assembly.

4. Install filter drain hose onto outlet adapter.

5. If drain hose is not clogged, place check mark in appropriate space provided on Performance Test Sheet. If hose is clogged, refer to troubleshooting table 6-8.

6. Turn test set FLOW SELECT valve (V2) to HIGH position.

7. Place test set OXY ANALYZER valve (V3) and CONC FLOW valve (V4) to OPEN position.

8. Adjust OBOGS ADAPTER PRESSURE CONTROL knob (4) until 15 psig is indicated on AIR/OXY PRESSURE gage (G1) on the high-pressure swing.

9. Adjust FLOW PRESSURE CONTROL valve (RG2) until 30 inches of water at high pressure swing is indicated on FLOW PRESSURE gage (G2).

10. Maintain 30 inches of water (at high-pressure swing) as indicated on FLOW PRESSURE gage (G2). Allow reading on % OXYGEN meter (M3) to stabilize approximately 5 minutes.

NOTE

If concentrator fails Oxygen Flow Test, ensure that test set monitor is working properly (refer to paragraph 6-30 for test set monitor test).

11. Record pressure readings from Air Supply Gage (1), AIR/OXY PRESSURE gage (G1) and % OXYGEN meter (M3) on Performance Test Sheet. Readings shall meet the requirement listed on Performance Test Sheet.

12. Turn FLOW SELECT valve (V2) to MED position and repeat steps 8 through 11.

13. Turn FLOW SELECT valve (V2) to LOW position and repeat steps 8 through 11.

14. Turn FLOW SELECT valve (V2) to HIGH position.

15. Adjust OBOGS ADAPTER PRESSURE CONTROL knob (4) until 50 psig is indicated on AIR/OXYGEN PRESSURE gage (G1) during the high pressure swing. Repeat steps 9 through 13.

16. If readings are within tolerance secure test set, OBOGS Adapter Assembly and Concentrator as follows:

17. Back out OBOGS ADAPTER PRESSURE CONTROL knob (4) counterclockwise until a zero pressure reading is indicated on AIR/OXYGEN PRESSURE gage (G1).

18. Back out FLOW PRESSURE CONTROL Valve (RG2) counterclockwise until spring tension is released.

19. Set CONC ON switch (S1) to OFF.

20. Set CONC FLOW valve (V4) and OXY ANALYZER valve (V3) to CLOSED position.

21. Set 28 VDC ON circuit breaker (CB 1) and 115 VAC ON circuit breaker (CB2) to OFF. Turn 28 VDC power supply and 115 volt 400 Hz power source to test set OFF.

22. Turn OBOGS Adapter Assembly Valve (3) to Off position.

23. Shutoff Air Source Supply Valve (2). Open OBOGS Adapter Assembly Bleed Ports (9) until Air source gauge (1) bleeds to zero psig.

24. Close Bleed Ports (9).

25. Remove OBOGS Adapter Assembly Inlet Hose (11) from OBOGS Adapter Assembly Inlet Connection (6) and Shop Air Source.

26. Disconnect OBOGS Adapter Assembly Outlet Hose (10) from OBOGS Adapter Assembly Outlet port (8) and concentrator inlet port.

27. Remove concentrator outlet hose assembly from concentrator outlet fitting (2) and OXY FROM CONC fitting (J3) of test set.

28. Remove muffler assembly from concentrator.

29. Remove 28 VDC cable assembly from 28-volt power supply and test set. Install cap assembly onto connector (J10) on test set.

30. Remove 115 VAC cable assembly from source of 115 volt, 400 Hz source and test set. Install cap assembly onto connector (J12) on test set.

31. Install protective shipping caps on all removed components and store in lid of test set.

32. Ensure test. set switches and valves are in the same position as in test set up paragraph 6-32, steps 1 through 8.

33. Ensure that test set caps, cover and screw assemblies are installed on their applicable fittings.

34. Stow all test set components in test set, place test set lid on test set case. Secure lid to case by using the 8 latches attached to lid.

35. Stow all OBOGS ADAPTER assembly hoses in box and secure box.

6-45. TROUBLESHOOTING.

6-46. Troubleshooting is prepared in a logical sequence. Due to the complete wiring and etc., each step will identify the type of test or inspection (with tolerances) to be performed with the expected end results. All tests and steps permit only two outcomes. Each item to be replaced is identified in replacement steps. After performing a repair task, recheck the operation of the concentrator component. If the malfunction is corrected, that is the end of the procedure; if not, proceed to the next step in the troubleshooting table or to the next troubleshooting table indicated. Once the malfunction has been corrected, return to Bench Test procedures and continue testing the concentrator. Troubleshoot the concentrator using the procedure outlined in tables 6-2 through 6-8.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Compound, Leak Detection, Type 1	MIL-L-25567

Support Equipment Required

Quantity	Description	Reference Number
1	Adapter Assembly, Outlet	1779AS522-1
1	Adapter Assembly, Exhaust	1779AS524-1
1	Cable Assembly, Concentrator	1779AS516-1
1	Cable Assembly, Power Supply	1779AS180-1
1	Cable Assembly, Power Supply	1779AS517-1
1	Concentrator Test Set, Model TTU-518A/E	1779AS500-2 (CAGE 30003)
1	Hose Assembly, Inlet	1779AS133-1
1	Hose Assembly, Outlet	1779AS134-1
1	Hose Assembly, Oxygen	5SE01859-1
1	Muffler Assembly	1779AS578-1

6-47. DISASSEMBLY.

6-48. Disassemble GGU-12/A concentrator using index numbers assigned to figure referred to unless otherwise noted. Disassemble GGU-12/A concentrator only as far as required to correct any malfunction. Some components can be removed from the concentrator without first removing mounting plate (1, figure 6-10) and/or stabilizer plate (5, figure 6-9).

Table 6-2. Troubleshooting (Heater Lamp (Illuminates and Does Not Extinguish))

<table>
<tr><th>Trouble</th><th>Probable Cause</th><th>Remedy</th></tr>
<tr><td>Test Set 115 V Heater Lamp (DS6) illuminates and does not extinguish.</td><td>Special cable assembly Junction box assembly thermal resistor (RT1).</td><td>Isolate and repair by performing steps below.</td></tr>
<tr><td colspan="3">1. Turn 115V AC ON circuit breaker (CB2) to off position.
2. Disconnect J2 from junction box assembly.
3. Allow concentrator heater assembly and inlet filter assembly to cool to room temperature.
4. Using an ohmmeter, measure resistance between special cable assembly connector (J2) pins (22) and (21).
a. If resistance is between 8.5 kohm and 11.5 kohm, go to step 6.
b. If resistance is above 11.5 kohm, go to step 5.
5. Remove cable assembly EMI cover and measure resistance of thermal resistor (RT1).
a. If resistance is between 8.5 kohm and 11.5 kohm, replace special cable assembly.
b. If resistance is above 11.5 kohm, replace thermal resistor (RT1).
6. Replace junction box assembly.</td></tr>
</table>

Table 6-3. Troubleshooting (Pressure Reducer)

Trouble	Probable Cause	Remedy
AIR-OXY PRESSURE gage (G1) indicates above 54 psig.	Pressure reducer.	Replace pressure reducer.
AIR-OXY PRESSURE gage (G1) indicates below 47.5 psig.	Pressure reducer.	Replace pressure reducer.

Table 6-4. Troubleshooting (Heater Lamp (Does Not Illuminate))

Trouble	Probable Cause	Remedy
Test Set 115 V Heater LAMP (DS6) does not illuminate.	Special cable assembly. Heater assembly. Junction box assembly. Thermal resistor (RT1). Thermostatic switch.	Isolate and repair by performing steps below.

1. Turn 115 VAC ON circuit breaker (CB2) to off position.
2. Disconnect connector (J2) from junction box assembly.
3. Turn 115 VAC ON circuit breaker (CB2) to on position and measure 115 V between pins (9, 115 V) and (8, return).
   a. If voltage is not present, replace special cable assembly.
   b. If voltage is present, proceed to step 4.
4. Turn 115 VAC ON circuit breaker (CB2) to off position and allow concentrator heater assembly and inlet filter assembly to cool to room temperature. Using an ohmmeter, measure between pins (22) and (21) of special cable assembly connector (J2).
   a. If resistance is between 8.5 kohms and 11.5 kohms, go to step 6.
   b. If resistance is below 8.5 kohms, replace thermal resistor (RT1).
5. Using an ohmmeter, measure resistance between special cable assembly connector (J2) pins (10) and (11).
   a. If resistance is between 24 ohms and 27 ohms, go to step 7.
   b. If resistance is above 27 ohms, go to step 6.
6. Remove cable assembly electrical box cover. Using an ohmmeter, measure resistance between heater assembly electrical leads.
   a. If resistance is between 24 ohms and 27 ohms, replace special cable assembly.
   b. If resistance is above 27 ohms, replace heater assembly.
7. Using an ohmmeter, measure resistance between special cable assembly connector (J2) pins (17) and (19).
   a. If resistance is below 2 ohms, go to step 8.
   b. If resistance is above 2 ohms, replace junction box assembly.
8. Remove special cable assembly switch cover. Using an ohmmeter, measure resistance between VIO and BLU wires.
   a. If resistance is 2 ohms or below, replace special cable assembly.
   b. If resistance is above 2 ohms, replace thermostatic switch.

Table 6-5. Troubleshooting (Motor)

Trouble	Probable Cause	Remedy
115 V MOTOR (M2) ammeter exceeds 0.3 amps.	Special cable assembly. Junction box assembly. Rotary valve assembly.	Isolate and repair by performing steps below.

1. Turn 115 VAC ON circuit breaker (CB2) to off position.
2. Disconnect J2 from junction box assembly and observe ammeter (M2).
3. Turn 115 VAC ON circuit breaker (CB2) to on position.
   a. If current exceeds reading obtained in step 2, replace special cable assembly.
   b. If current reading is the same as the reading obtained in step 2, go to step 4.
4. Turn 115 VAC ON circuit breaker (CB2) to off position.
5. Disconnect connector from rotary valve assembly and using an ohmmeter measure between connector pins (WHT)-(YEL), (WHT)-(RED), (YEL)-(RED) and (WHT), (YEL), (RED) to chassis ground respectively.
   a. If any reading is less than infinite, replace special cable assembly.
   b. If all readings are infinite, ensure pins are isolated from one another and go to step 6.
6. Reconnect J2 to junction box assembly.
7. Turn 115 VAC ON circuit breaker (CB2) to on position.
   a. If current exceeds reading obtained in step 2, replace junction box assembly.
   b. If current reading is the same as the reading obtained in step 2, replace rotary valve assembly.

Table 6-6. Troubleshooting (Rotary Valve)

Trouble	Probable Cause	Remedy
Rotary valve does not operate, no pressure cycles (high to low flow) at output of concentrator.	Special cable assembly. Junction box assembly. Rotary valve assembly.	Isolate and repair by performing steps below.

1. Disconnect J2 from junction box assembly and measure 115 V between pins (7, 115 V) and (8, return).
   a. If voltage is not present, replace special cable assembly.
   b. If voltage is present, proceed to step 2.
2. Disconnect connector from rotary valve assembly and measure 115 V between connectors (WHT) 115 V and (YEL) return.
   a. If voltage is not present, replace junction box assembly.
   b. If voltage is present, replace rotary valve assembly.

Table 6-7. Troubleshooting (Internal/External Leakage)

<table>
<tr><th>Trouble</th><th>Probable Cause</th><th>Remedy</th></tr>
<tr><td>Internal/external leakage exceeds 3 psig per minute or 15 psig in 5 minutes.</td><td>Foreign material dirt, loose screws, defective preformed packing etc. Check valve assemblies defective.</td><td>Isolate and repair by performing steps below.</td></tr>
<tr><td colspan="3">NOTE

Ensure all test set hose assemblies from test set concentrator are properly attached and not leaking.

1. Using leak detection compound inspect concentrator for external leakage as indicated by bubbles.
a. If external leak is detected, visually inspect for foreign matter, defective component parts or other obvious damage; clean, repair, or replace component parts as necessary and continue Bench Test.
b. If no external leak is detected and check valve assemblies were not replaced in step 1a, remove and replace check valve assemblies and continue Bench Test.</td></tr>
</table>

Table 6-8. Troubleshooting (Oxygen Flow Test/Filter Drain Flow Test)

Trouble	Probable Cause	Remedy
	NOTE When troubleshooting Oxygen Flow Test only, perform one probable cause and remedy at a time, then return to Bench Test to see if concentrator passes Oxygen Flow Test.	
No air flow detectable through filter drain hose.	Filter drain path is clogged.	1. Remove hose. 2. Check for air flow at hose barb. 3. If there is air flow at hose barb, replace hose. 4. If there is no air flow at hose barb, remove and replace inlet filter assembly.
Concentrator does not produce minimum required oxygen % during flow test or AIR-OXY PRESSURE gage (G1) readings do not fall within minimum and maximum allowable tolerances.	Oxygen monitor of test set may need replacing.	Perform Test Set Monitor Test. Refer to appropriate support equipment technical manual.
	Filter tube element dirty and clogged.	Replace filter tube element.
	Sieve beds contaminated.	Replace sieve beds.

CAUTION

All disassembly, inspection, repair, and assembly must be done on clean benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor, and ceiling should have a smooth finish and be painted with non-chalking paint which can be kept clean and dust free.

NOTE

It is desirable to keep all parts for each individual component separated. Make careful note of the location and quantity of all parts. Plastic portioned boxes with covers or similar storage partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

Materials Required

Quantity	Description	Reference Number
1	Plexiglas or Equivalent, 10 Inches Square	—
10	Nuts, 4/40	—
10	Screw, Machine, 4/40 X 1 Inch	—

NOTE

For local manufacture of part peg board (1, figure 6-8), proceed as follows:

1. Cut out a board (1), approximately 10 inches square, from suitable material (e.g., Plexiglas or equivalent).

2. Draw circles and spacer outlines, label as shown.

3. Drill holes (1/8 inch) in each outline, approximate location as shown.

4. Insert 4/40 machine screws approximately 1 inch long and secure with nuts.

6-49. STABILIZER PLATE REMOVAL. To remove the Stabilizer Plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
5	Setscrew	MIL51963-55
3	Setscrew	MS51963-30
2	Setscrew	MS51964-71

Support Equipment Required

Quantity	Description	Reference Number
1	Board, Peg	Fabricate IAW figure 6-8
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 6-9 unless otherwise noted.

1. Remove cotter pins (1) and webbing strap (2).

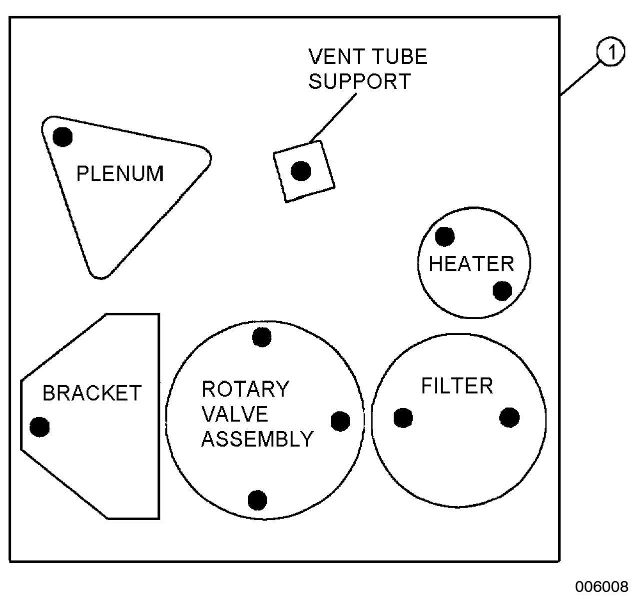


Figure 6-8. Peg Board for Washers/Spacers

2. Unfasten and remove concentrator shroud (3).

WARNING

When removing screws from stabilizer plate, it may be necessary to heat screws to facilitate removal. The heat gun can generate extreme heat that can cause severe burns.

3. Remove four machine screws (4) securing stabilizer plate (5) to molecular sieve bed assemblies (6).

4. Remove three machine screws (7) and flat washers (8) securing stabilizer plate (5) to junction box bracket (9). Replace machine screws (7) with three setscrews (MS51963-30) to retain spacers (10) during disassembly.

5. Carefully cut lockwire, and remove three hex nuts (11) and flat washers (12) securing stabilizer plate (5) to plenum assembly (13).

6. Remove one machine screw (14) and flat washer (15) securing stabilizer plate (5) to vent tube support (16). Replace machine screw (14) with setscrew (MS51963-55) to retain flat washers (17) during disassembly.

7. Remove four machine screws (18) and flat washers (19) securing stabilizer plate (5) to electrical-mechanical posts (20). Replace machine screws (18) with setscrews (MS51963-55) to retain flat washers (21) during disassembly.

8. Carefully cut lockwire, and remove two hex nuts (22) and flat washers (23) securing stabilizer plate (5) to inlet filter assembly (24).

9. Carefully cut lockwire, and remove two hexagon cap screws (25) and flat washers (26) securing stabilizer plate (5) to heater assembly (27). Replace hexagon cap screws (25) with setscrews (MS51964-71) to retain heater spacers (28), nonmetallic washers (29), and flat washers (30) during disassembly.

10. Remove stabilizer plate (5) and concentrator shroud (34) from concentrator.

NOTE

When removing height adjustment washers and spacers from concentrator, place in appropriate location on peg board (figure 6-8) as removed. During assembly, the height adjustment washers and spacers must be replaced in the same location.

11. Remove spacers (10) and place in appropriate location on peg board for storage. Repeat for shims (31), flat washers (17), flat washers (21), heater spacers (28), nonmetallic washers (29) and flat washers (30).

12. Remove electrical-mechanical post (32) and flat washers (33) from inlet filter assembly (24), and place flat washers (33) in appropriate location on peg board for storage.

13. Remove setscrews temporarily installed for disassembly procedures in junction box bracket (9), vent tube support (16), electrical-mechanical posts (20), and heater assembly (27).

6-50. MOUNTING PLATE REMOVAL. To remove the Mounting Plate, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002

NOTE

Index numbers refer to figure 6-10 unless otherwise noted.

1. Turn concentrator over and place on work bench so that mounting plate assembly (1) is on top.

WARNING

When removing screws from mounting plate, it may be necessary to heat screws to facilitate removal. The heat gun can generate extreme heat that can cause severe burns.

2. Remove eight machine screws (2) securing mounting plate assembly (1) to molecular sieve bed assemblies (3).

3. Remove four machine screws (4) securing mounting plate assembly (1) to junction box assembly (5).

4. Remove two machine screws (6) securing mounting plate assembly (1) to rotary valve assembly (7).

5. Remove three machine screws (8) securing mounting plate assembly (1) to oxygen fitting (9).

6. Remove two machine screws (10) securing mounting plate assembly (1) to heater assembly (11).

7. Remove three machine screws (12) securing mounting plate assembly (1) to electrical box (13).

8. Carefully turn concentrator over so that it is resting on the mounting plate assembly (1) to provide access, and remove socket head cap screw (14), lockwasher (15), and flat washer (16) securing ground terminal (17) to mounting plate assembly (1).

9. Carefully cut lockwire, and remove machine screw (19) and flat washer (20) from mounting plate assembly (1).

10. Separate mounting plate assembly (1) from concentrator.

11. Remove concentrator shroud (21), cushion disk (18) and ring spacers (22) from mounting plate assembly (1). Remove machine screw (23), flat washer (24) and strap assembly (25). Remove machine screw (26) and flat washer (27) and strap assembly (28).

6-51. SHROUD ASSEMBLY REMOVAL. To remove the Shroud Assembly, proceed as follows:

1. Unfasten and remove concentrator shroud (3, figure 6-9).

2. Remove stabilizer plate, refer to Stabilizer Plate Removal (paragraph 6-49).

3. Remove mounting plate, refer to Mounting Plate Removal (paragraph 6-50).

4. Remove concentrator shroud from stabilizer plate and discard.

5. Remove concentrator shroud from mounting plate and discard.

6-52. PRESSURE REDUCER ASSEMBLY REMOVAL. To remove the Pressure Reducer Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-11 unless otherwise noted.

Ensure that concentrator is positioned so that the components are upright.

1. Remove two socket head cap screws (11), lockwashers (12), and flat washers (13) to disconnect the metallic bent tube assembly (10) from the inlet filter assembly (14).

2. Remove two socket head cap screws (37), lockwashers (38), and remove the pressure reducer assembly (39) from the rotary valve assembly (5). Remove and discard the preformed packing (40).

3. Remove two socket head cap screws (7), spring lockwashers (8), and flat washers (9) to disconnect the metallic bent tube assembly (10) from the pressure reducer assembly (39).

4. Remove the metallic bent tube assembly (10), and remove and discard preformed packings (15) and (16).

5. Remove electrical-mechanical post (46) and hex nut (47).

6-53. ROTARY VALVE ASSEMBLY REMOVAL. To remove the Rotary Valve Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-11 unless otherwise noted.

1. Remove two machine screws (31) to detach rotary valve assembly (5) from mounting plate assembly (32).

2. Carefully cut and remove electrical tiedown straps (28).

3. Remove electrical-mechanical post (41) from rotary valve assembly (5).

4. Remove four socket head cap screws (21), lockwashers (22), and flat washers (23) to disconnect metallic bent tube assembly (20) and metallic tube assembly (27) from molecular sieve bed assembly (24).

5. Remove two socket head cap screws (11), lockwashers (12), and flat washers (13) to disconnect the metallic bent tube assembly (10) from the inlet filter assembly (14).

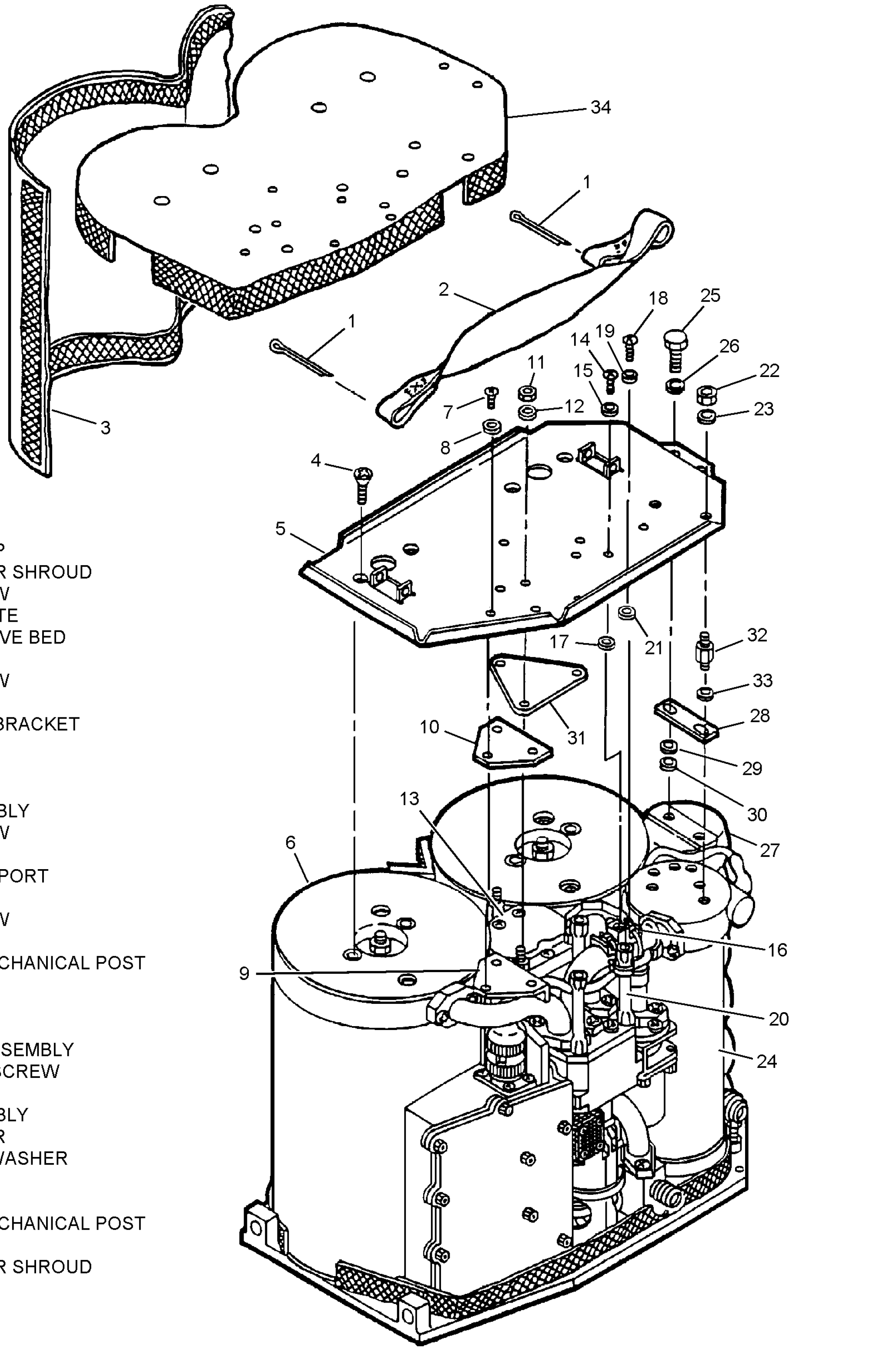
6. Remove two socket head cap screws (1), lockwashers (2), and flat washers (3), and remove metallic tube assembly (4) from rotary valve assembly (5). Remove and discard preformed packing (6).

6A. Using inlet filter drain tube pliers (P/N 3309311-1) remove non-metallic tube from rotary valve vent tube and inlet filter assembly.

NOTE

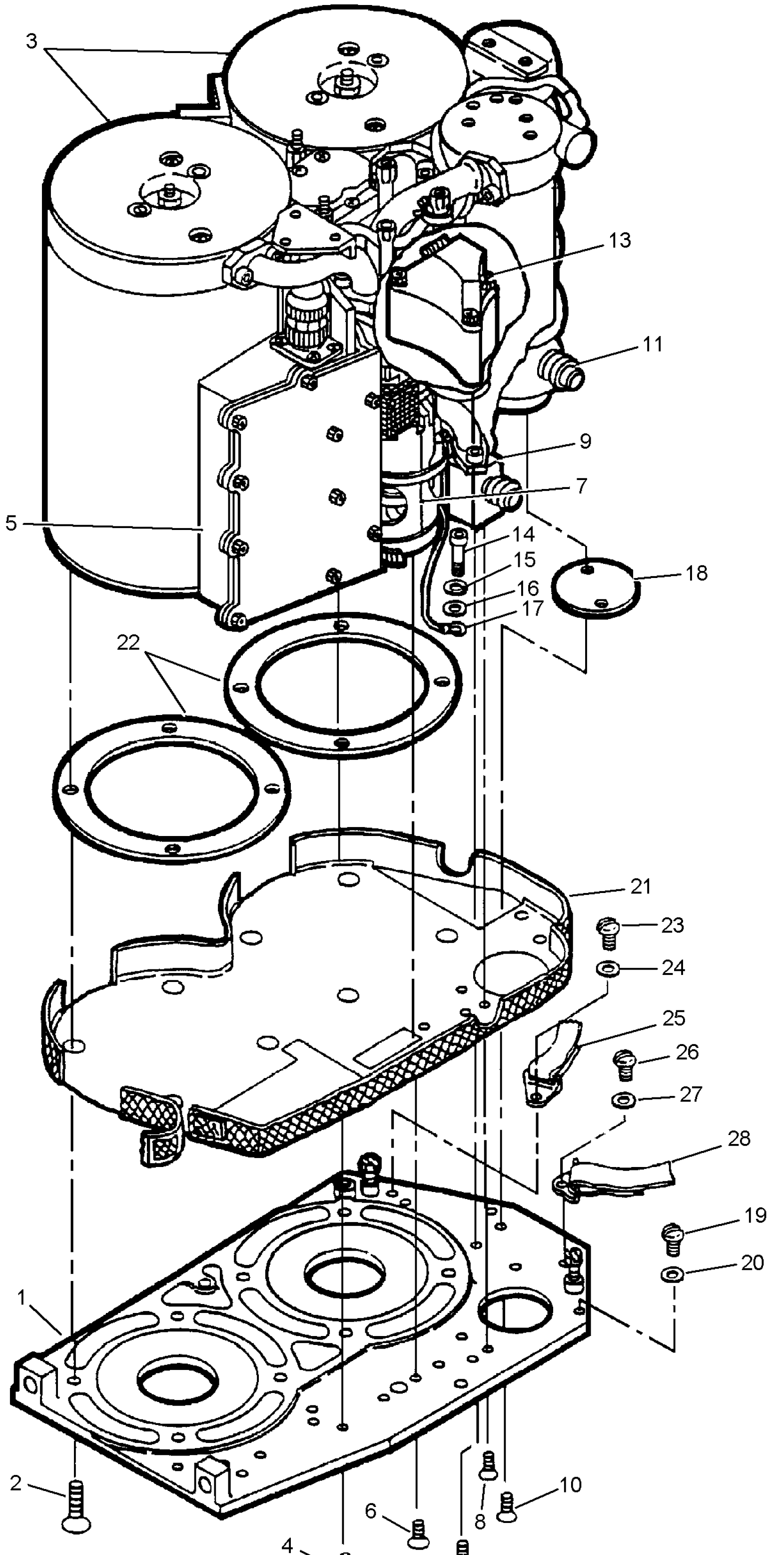
If new rotary valve, P/N 1657420-1, is installed, perform step 6B.

6B. Using inlet filter drain pliers (part no. 3309311-1), remove non-metallic tube from bottom corner of rotary valve and metallic tube (rotary valve vent tube).



1. COTTER PIN
2. WEBBING STRAP
3. CONCENTRATOR SHROUD
4. MACHINE SCREW
5. STABILIZER PLATE
6. MOLECULAR SIEVE BED ASSEMBLIES
7. MACHINE SCREW
8. FLAT WASHER
9. JUNCTION BOX BRACKET
10. SPACER
11. HEX NUT
12. FLAT WASHER
13. PLENUM ASSEMBLY
14. MACHINE SCREW
15. FLAT WASHER
16. VENT TUBE SUPPORT
17. FLAT WASHER
18. MACHINE SCREW
19. FLAT WASHER
20. ELECTRICAL-MECHANICAL POST
21. FLAT WASHER
22. HEX NUT
23. FLAT WASHER
24. INLET FILTER ASSEMBLY
25. HEXAGON CAP SCREW
26. FLAT WASHER
27. HEATER ASSEMBLY
28. HEATER SPACER
29. NONMETALLIC WASHER
30. FLAT WASHER
31. SHIMS
32. ELECTRICAL-MECHANICAL POST
33. FLAT WASHER
34. CONCENTRATOR SHROUD

Figure 6-9. Shroud Assembly/Stabilizer Plate Removal/Installation



1. MOUNTING PLATE ASSEMBLY
2. MACHINE SCREW
3. MOLECULAR SIEVE BED ASSEMBLIES
4. MACHINE SCREW
5. JUNCTION BOX ASSEMBLY
6. MACHINE SCREW
7. ROTARY VALVE ASSEMBLY
8. MACHINE SCREW
9. OXYGEN FITTING
10. MACHINE SCREW
11. HEATER ASSEMBLY
12. MACHINE SCREW
13. ELECTRICAL BOX
14. SOCKET HEAD CAP SCREW
15. LOCK WASHER
16. FLAT WASHER
17. GROUND TERMINAL
18. CUSHION DISKS
19. MACHINE SCREW
20. FLAT WASHER
21. CONCENTRATOR SHROUD
22. RING SPACER
23. MACHINE SCREW
24. FLAT WASHER
25. STRAP ASSEMBLY
26. MACHINE SCREW
27. FLAT WASHER
28. STRAP ASSEMBLY

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Figure 6-10. Shroud Assembly/Mounting Plate Removal/Assembly

7. Carefully cut insulation sleeving and disconnect male/female connectors on RED, WHT and YEL wires extending from rotary valve electrical connector (29) from male/female connectors on RED, WHT and YEL wires extending from cable assembly electrical connector (30).

8. Remove socket head cap screw (42), lockwasher (43), flat washer (44) and ground lug (45) from mounting plate assembly (32). Remove rotary valve assembly, with attached components, from concentrator.

9. Remove two socket head cap screws (37) and lockwashers (38), and then remove the pressure reducer assembly (39) from the rotary valve assembly (5). Remove and discard the preformed packing (40).

10. Remove two socket head cap screws (17), lockwashers (18), and flat washers (19) to disconnect the metallic bent tube assembly (20) from the rotary valve assembly (5).

11. Remove the metallic bent tube assembly (20), and remove and discard preformed packings (25) and (26).

12. Repeat step 10 and 11 for the other metallic tube assembly (27).

13. Remove hose clamps (33) and (34), and carefully separate the motor mount halves (35) and loop clamp (36) from motor.

6-54. PLENUM ASSEMBLY REMOVAL. To remove the Plenum Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Remove two socket head cap screws (1), lockwashers (2), and flat washers (3) to disconnect metallic tube assembly (4) from oxygen fitting (5).

2. Remove two spring tension clips (7) on sleeve bushings (8).

3. Retract two sleeve bushings (8) from molecular sieve bed assemblies (10) and (11) by sliding sleeve bushings (8) into plenum assembly (9). This procedure will free plenum assembly (9) from molecular sieve bed assemblies (10) and (11).

4. Remove two sleeve bushings (8), and remove and discard two preformed packings (12) from plenum assembly (9). Remove and discard two preformed packings (13) from molecular sieve bed assemblies (10) and (11).

5. Carefully lift the plenum assembly (9) for access to socket head cap screws (14).

6. Remove two socket head cap screws (14), lockwashers (15), flat washers (16), and metallic tube assembly (4) from the plenum assembly (9).

7. Remove and discard preformed packing (6) and (17).

6-55. PLENUM ASSEMBLY DISASSEMBLY. To disassemble the Plenum Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Remove electrical-mechanical post (28) from plenum (24).

2. Remove two special bolts (20), three machine screws (21), lockwashers (22) and manifold (23) from plenum (24).

3. Remove and discard two machine screws (29) and two preformed packings (12).

4. Remove three machine screws (30) and plenum cover (31) from plenum (24).

5. Remove machine screw (32), lockwashers (33), fluid filtering disk (34), and fluid filter element (35) from plenum cover (31).

6. Remove and discard preformed packings (36) and (37), two preformed packings (27) and two preformed packings (26).

7. Remove two check valves (25).

6-56. CHECK VALVE ASSEMBLY REMOVAL. To remove the Check Valve Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Remove two electrical-mechanical posts (20).

2. Retract two sleeve bushings (8) from molecular sieve bed assemblies (10) and (11) by sliding sleeve bushings (8) into plenum assembly (9). This procedure will free plenum assembly from molecular sieve bed assemblies.

3. Remove three machine screws (21), and lockwashers (22) securing manifold (23) to plenum (24).

4. Remove manifold (23) and two check valves (25).

5. Remove two sleeve bushings (8), and remove and discard two preformed packings (12) from manifold (23). Remove and discard two preformed packings (13) from molecular sieve bed assemblies (10) and (11).

6. Remove and discard preformed packings (26) and (27).

6-57. OXYGEN FITTING REMOVAL. To remove the Oxygen Fitting, proceed as follows:

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Remove three machine screws (18) to detach oxygen fitting (5) from mounting plate assembly (19).

2. Remove two socket head cap screws (1), lockwashers (2), and flat washers (3) to detach metallic tube assembly (4) from oxygen fitting (5).

3. Carefully slide oxygen fitting (5) from the concentrator. Remove and discard preformed packing (6).

6-58. JUNCTION BOX ASSEMBLY REMOVAL. To remove the Junction Box Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Remove two socket head cap screws (5), spring lockwashers (6), flat washers (7), and junction box bracket (8) from junction box assembly (2).

2. Disconnect special cable assembly electrical connector J2 (1) from connector on junction box assembly (2).

3. Remove four machine screws (3) and junction box assembly (2) from mounting plate assembly (4).

4. Remove two damping pads (28) from junction box assembly (2).

6-59. FILTER ELEMENT TUBE REMOVAL. To remove the Filter Element Tube, proceed as follows:

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Cut lockwire (17) and remove special bolt (16) from bottom of concentrator assembly.

2. Remove helical retainer (29) and support cup (30).

3. Grasp filter housing sleeve (31) and push down to separate filter housing sleeve from inlet filter housing (32) and expose water trap (32A) with seat (32B), and filter element (33) attached.

4. To allow for removal of water trap (32A) and disassembly of the filter housing sleeve (31) from the filter base (34), insert a small bladed screwdriver above metal on the top of water trap (32A). Push down on the top of water trap (32A) and while holding against the spring tension, tilt water trap and filter housing sleeve toward the front of the concentrator and out from under inlet filter housing (32).

5. Remove filter mount base (34) with filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), and inlet filter housing (32) with all attached parts.

6. Remove filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), helical retainers (35 and 36), and helical spring (37) from filter mount base (34).

7. Remove and discard seat (32B) and filter element tube (33) from water trap (32A).

NOTE

Water trap (32A) and seat (32B) are new items and must be ordered and installed during reassembly of the inlet filter assembly.

8. Remove and discard preformed packings (38), (39), (40) and (41).

6-60. INLET FILTER ASSEMBLY REMOVAL. To remove the Inlet Filter Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Remove four screws (9) from inlet filter housing.

2. Remove cable assembly EMI cover (11) and thermal resistor (12) from the inlet filter housing (32).

3. Remove and discard preformed packing (13).

4. Remove inlet filter housing (32) from heater assembly (23).

5. Remove and discard preformed packing (24).

1. SOCKET HEAD CAP SCREW
2. LOCK WASHER
3. FLAT WASHERS
4. METALLIC TUBE ASSEMBLY
5. ROTARY VALVE ASSEMBLY
6. PREFORMED PACKING
7. SOCKET HEAD CAP SCREW
8. SPRING LOCK WASHER
9. FLAT WASHER
10. METALLIC BENT TUBE ASSEMBLY
11. SOCKET HEAD CAP SCREW
12. LOCK WASHER
13. FLAT WASHER
14. INLET FILTER ASSEMBLY
15. PREFORMED PACKING
16. PREFORMED PACKING
17. SOCKET HEAD CAP SCREW
18. LOCK WASHER
19. FLAT WASHER
20. METALLIC BENT TUBE ASSEMBLY
21. SOCKET HEAD CAP SCREW
22. LOCK WASHER
23. FLAT WASHER
24. MOLECULAR SIEVE BED ASSEMBLIES
25. PREFORMED PACKING
26. PREFORMED PACKING
27. METALLIC TUBE ASSEMBLY
28. ELECTRICAL TIEDOWN STRAP
29. ROTARY VALVE ELECTRICAL CONNECTOR
30. CABLE ASSEMBLY ELECTRICAL CONNECTOR
31. MACHINE SCREW
32. MOUNTING PLATE ASSEMBLY
33. HOSE CLAMP
34. HOSE CLAMP
35. MOTOR MOUNT HALVES
36. LOOP CLAMP
37. SOCKET HEAD CAP SCREW
38. LOCK WASHER
39. PRESSURE REDUCER ASSEMBLY
40. PREFORMED PACKING
41. ELECTRICAL-MECHANICAL POST
42. SOCKET HEAD CAP SCREW
43. LOCK WASHER
44. FLAT WASHER
45. GROUND LUG
46. ELECTRICAL-MECHANICAL POST
47. HEX NUT

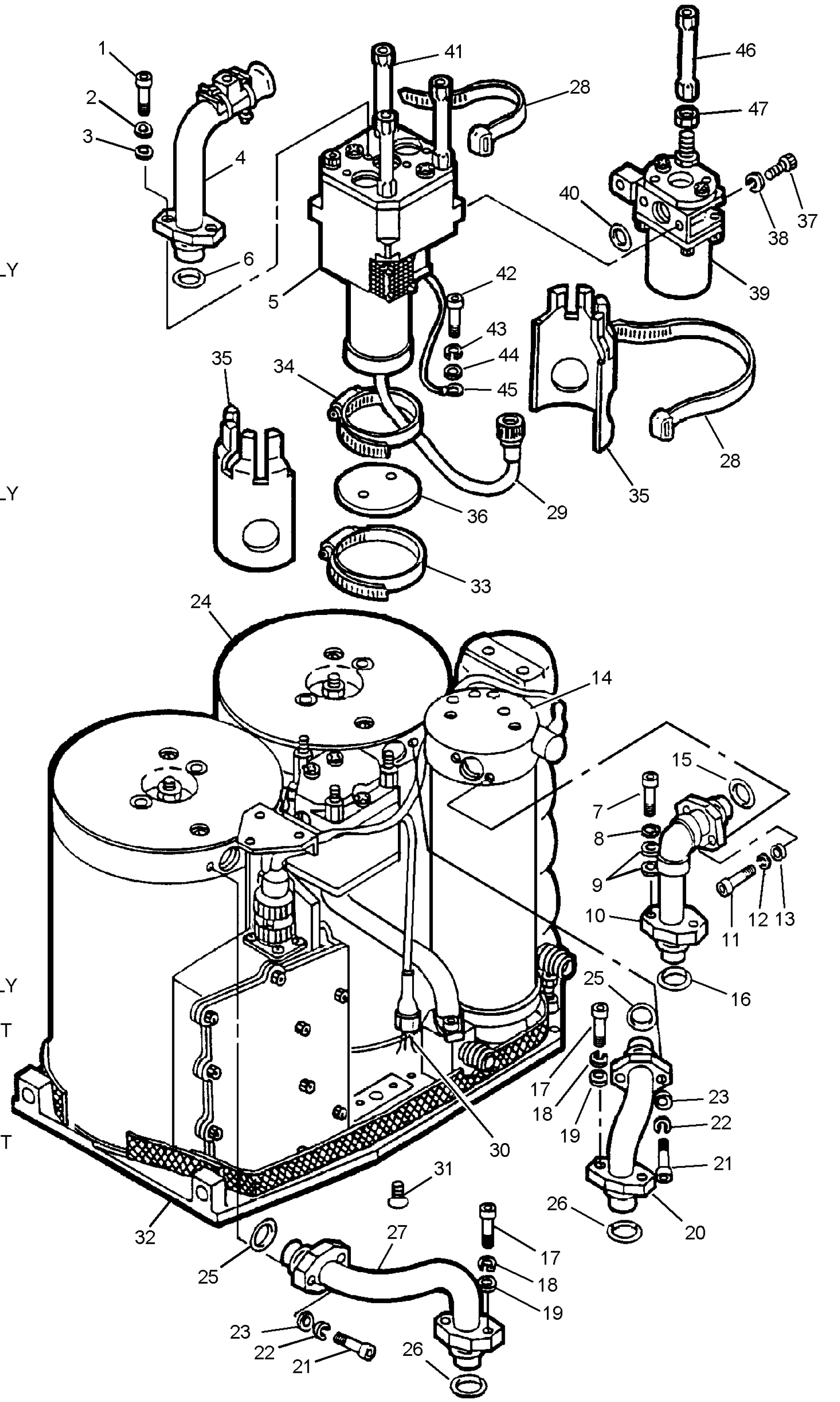
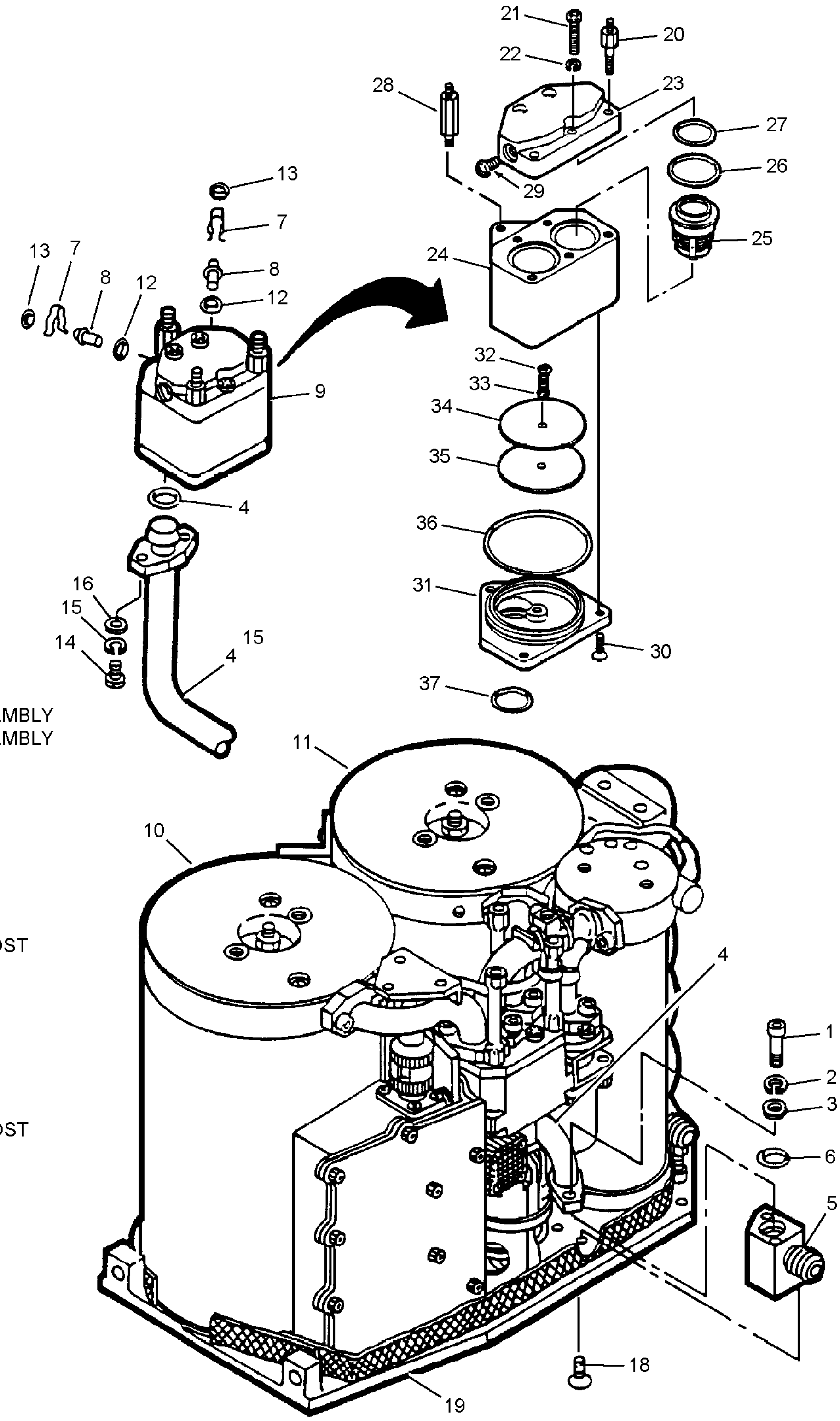


Figure 6-11. Rotary Valve Assembly/Pressure Reducer Assembly Removal/Assembly



1. SOCKET HEAD CAP SCREW
2. LOCK WASHER
3. FLAT WASHER
4. METALLIC TUBE ASSEMBLY
5. OXYGEN FITTING
6. PREFORMED PACKING
7. SPRING TENSION CLIPS
8. SLEEVE BUSHING
9. PLENUM ASSEMBLY
10. MOLECULAR SIEVE BED ASSEMBLY
11. MOLECULAR SIEVE BED ASSEMBLY
12. PREFORMED PACKING
13. PREFORMED PACKING
14. SOCKET HEAD CAP SCREW
15. LOCK WASHER
16. FLAT WASHER
17. PREFORMED PACKING
18. MACHINE SCREW
19. MOUNTING PLATE ASSEMBLY
20. ELECTRICAL-MECHANICAL POST
21. MACHINE SCREW
22. LOCK WASHER
23. MANIFOLD
24. PLENUM
25. CHECK VALVE ASSEMBLY
26. PREFORMED PACKING
27. PREFORMED PACKING
28. ELECTRICAL-MECHANICAL POST
29. MACHINE SCREW
30. MACHINE SCREW
31. PLENUM COVER
32. MACHINE SCREW
33. LOCK WASHER
34. FLUID FILTERING DISK
35. FLUID FILTER ELEMENT
36. PREFORMED PACKING
37. PREFORMED PACKING

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Figure 6-12. Plenum Assembly/Oxygen Fitting Removal/Assembly

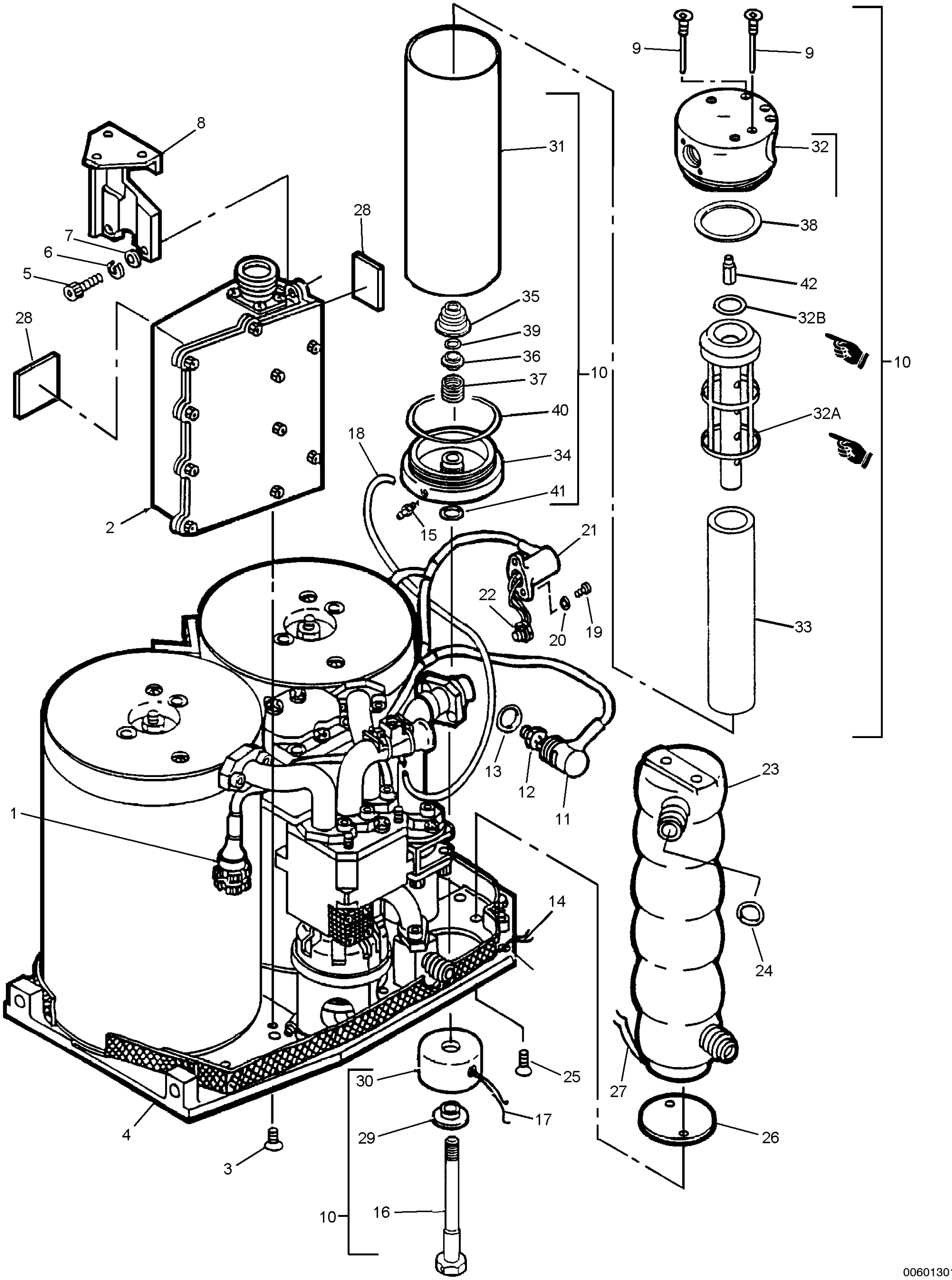

Figure 6-13. Junction Box/Inlet Filter/Heater Assembly Removal/Assembly (Sheet 1 of 2)

1.	SPECIAL CABLE ASSEMBLY ELECTRICAL CONNECTOR J2	23.	HEATER ASSEMBLY
2.	JUNCTION BOX ASSEMBLY	24.	PREFORMED PACKING
3.	MACHINE SCREW	25.	MACHINE SCREW
4.	MOUNTING PLATE ASSEMBLY	26.	CUSHION DISK
5.	SOCKET HEAD CAP SCREW	27.	HEATER ASSEMBLY LEADS
6.	SPRING LOCK WASHER	28.	DAMPING PAD
7.	FLAT WASHER	29.	HELICAL RETAINER
8.	JUNCTION BOX BRACKET	30.	SUPPORT CUT
9.	SETSCREW	31.	FILTER HOUSING SLEEVE
10.	INLET FILTER ASSEMBLY	32.	INLET FILTER HOUSING
11.	CABLE ASSEMBLY EMI COVER	32A.	WATER TRAP
12.	THERMAL RESISTOR	32B.	SEAL
13.	PREFORMED PACKING	33.	FILTER ELEMENT TUBE
14.	MACHINE SCREW	34.	FILTER MOUNT BASE
15.	TUBE FITTING	35.	HELICAL RETAINER
16.	SPECIAL BOLT	36.	HELICAL RETAINER
17.	LOCK WIRE	37.	HELICAL SPRING
18.	NONMETALLIC TUBING	38.	PREFORMED PACKING
19.	SOCKET HEAD CAP SCREW	39.	PREFORMED PACKING
20.	LOCK WASHER	40.	PREFORMED PACKING
21.	CABLE ASSEMBLY SWITCH COVE	41.	PREFORMED PACKING
22.	THERMOSTATIC SWITCH	42.	THREADED ADAPTER

Figure 6-13. Junction Box/Inlet Filter/Heater Assembly Removal/Assembly (Sheet 2 of 2)

6-61. INLET FILTER ASSEMBLY DISASSEMBLY. To disassemble the Inlet Filter Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Remove threaded adapter (42) from inlet filter housing (32).

2. Remove nonmetallic tubing (18) from tube fitting (15).

NOTE

The orifice and screen, once removed and discarded, are obsolete and will not be replaced during assembly.

3. Remove tube fitting (15) from filter mount base (34).

6-62. HEATER ASSEMBLY REMOVAL. To remove the Heater Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Remove socket head cap screw (19), lockwasher (20), cable assembly switch cover (21) and thermostatic switch (22) from heater assembly (23).

2. Remove two setscrews (9) from inlet filter housing (32).

3. Remove two machine screws (25) securing heater assembly (23) to mounting plate assembly (4).

4. Remove three machine screws (12, figure 6-10) securing mounting plate assembly (1, figure 6-10) to electrical box (13, figure 6-10).

5. Remove heater assembly (23) and electrical box (13, figure 6-10) as a unit, then remove electrical box to expose heater leads (27).

6. Carefully cut insulation sleeving and disconnect two heater assembly leads (27) and remove heater assembly (23).

7. Remove and discard preformed packing (24).

6-63. SPECIAL CABLE ASSEMBLY REMOVAL. To remove the Special Cable Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-14 unless otherwise noted.

1. Remove two socket head cap screws (5, figure 6-13), spring lockwashers (6, figure 6-13), flat washers (7, figure 6-13), and junction box bracket (8, figure 6-13) from junction box assembly (2).

2. Disconnect special cable assembly electrical connector J2 (1) from junction box assembly electrical connector (2).

3. Carefully cut and remove electrical tiedown strap (3).

4. Carefully cut insulation sleeving and disconnect rotary valve electrical connector (4) from cable assembly electrical connector (5).

5. Remove two setscrews (6) from top of inlet filter assembly (7), and remove cable assembly EMI cover (8) and thermal resistor (9).

6. Remove and discard preformed packing (10).

7. Remove two socket head cap screws (11), lockwashers (12), switch cover (13) and thermostatic switch (14) from heater assembly (15).

8. Remove three socket head cap screws (18), lockwashers (19), flat washers (20), and remove electrical box cover (21) from electrical box (22).

9. Carefully cut insulation sleeving and disconnect two electrical leads (16) from heater assembly (15).

10. Remove four socket head cap screws (23) flat washers (24), and electrical retaining plate (25) from electrical box (22).

11. Carefully cut and remove electrical tiedown straps (26) and (27), and remove special cable assembly (28).

6-64. MOLECULAR SIEVE BED ASSEMBLY REMOVAL. To remove the Molecular Sieve Bed Assembly, proceed as follows:

NOTE

Index numbers refer to figure 6-14 unless otherwise noted.

1. Remove two machine screws (29) and lockwashers (30) securing L-bracket (31) to molecular sieve bed assemblies (32) and (33).

2. Remove four socket head cap screws (34), lockwashers (35), and flat washers (36) securing metallic tube assembly (37) and metallic bent tube assembly (38) to molecular sieve bed assemblies (32) and (33).

3. Remove and discard preformed packing (39) and (40).

4. Remove eight machine screws (41) and carefully remove molecular sieve bed assemblies (32) and (33) from concentrator.

5. Remove and discard preformed packing (42) and (43).

6-65. CLEANING OF DISASSEMBLED PARTS.

6-66. To clean the disassembled oxygen concentrator component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275
As Required	Toluene	TT-T-548 NIIN 00-281-2002
As Required	Xylene	TT-X-916 (CAGE 81348)

1. CABLE ASSEMBLY ELECTRICAL CONNECTOR J2
2. JUNCTION BOX ASSEMBLY CONNECTOR J2
3. ELECTRICAL TIEDOWN STRAP
4. ROTARY VALVE ELECTRICAL CONNECTOR
5. CABLE ASSEMBLY ELECTRICAL CONNECTOR
6. SETSCREW
7. INLET FILTER ASSEMBLY
8. CABLE ASSEMBLY EMI COVER
9. THERMAL RESISTOR
10. PREFORMED PACKING
11. SOCKET HEAD CAP SCREW
12. LOCK WASHER
13. CABLE ASSEMBLY SWITCH COVER
14. THERMOSTATIC SWITCH
15. HEATER ASSEMBLY
16. CABLE ASSEMBLY ELECTRICAL LEADS
17. NONMETALLIC GROMMET
18. SOCKET HEAD CAPSCREW
19. LOCK WASHER
20. FLAT WASHER
21. ELECTRICAL BOX COVER
22. ELECTRICAL BOX
23. SOCKET HEAD CAP SCREW
24. FLAT WASHER
25. ELECTRICAL RETAINING PLATE
26. ELECTRICAL TIEDOWN STRAP
27. ELECTRICAL TIEDOWN STRAP
28. SPECIAL CABLE ASSEMBLY
29. MACHINE SCREW
30. LOCK WASHER
31. L-BRACKET
32. MOLECULAR SIEVE BED ASSEMBLY

32A. SPACER CUSHION

33. MOLECULAR SIEVE BED ASSEMBLY
34. SOCKET HEAD CAP SCREW
35. LOCK WASHER
36. FLAT WASHER
37. METALLIC TUBE ASSEMBLY
38. METALLIC BENT TUBE ASSEMBLY
39. PREFORMED PACKING
40. PREFORMED PACKING
41. MACHINE SCREW
42. PREFORMED PACKING
43. PREFORMED PACKING
44. MOUNTING PLATE ASSEMBLY
45. ELECTRICAL CONNECTOR

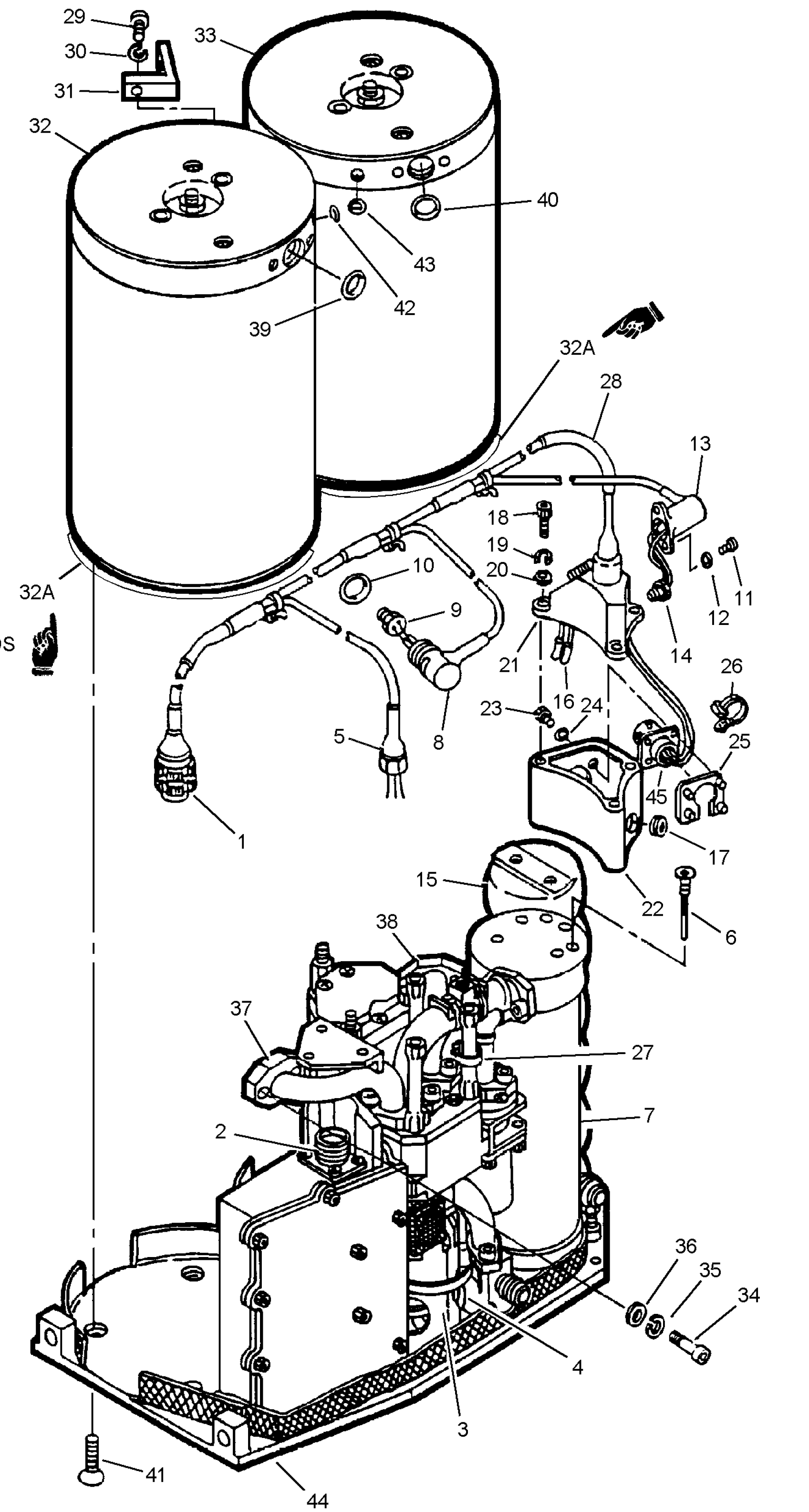

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Figure 6-14. Special Cable Assembly/Sieve Bed Removal/Assembly

Support Equipment Required

Quantity	Description	Reference Number
1	Goggles or Face Shield	NIIN 00-052-3776

WARNING

When working with oxygen, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Clean all electrical contact points by lightly furbishing with a fine abrasive material.

2. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free water-pumped nitrogen.

CAUTION

Do not attempt to clean any silicone rubber or elastic parts that have become contaminated with oil or grease. All such parts shall be replaced.

3. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free water-pumped nitrogen.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

WARNING

Use goggles for eye protection when using xylene or toluene when performing step 5.

5. Remove old RTV adhesive by applying small amounts of xylene or toluene.

6. Remove old sealant from screws using small amounts of acetone.

6-67. INSPECTION OF DISASSEMBLED PARTS.

6-68. Carefully inspect the disassembled oxygen concentrator for cleanliness, irregular wear, and good condition using the following procedures and guidance.

1. Inspect all electrical wiring for cuts, breaks in insulation covering, and clean contact points; replace as necessary.

2. Inspect all screws for nicks, burrs, rounded screwdriver slots and other obvious damage; replace as necessary.

3. Inspect all metallic surfaces for corrosion, cleanliness, and other obvious damage; clean or replace parts as necessary.

4. Inspect molecular sieve bed assemblies for security of self-sealing machine screws, nicks in sealing surfaces, stripped threads in screw holes, and cleanliness; replace or repair as necessary.

5. Inspect electrical receptacle connectors for bent pins, corrosion, and cleanliness; clean or replace as necessary.

6. Inspect shroud assemblies for cuts, tears, and other obvious damage, replace as necessary.

7. Inspect rotary valve assembly, pressure reducer assembly, inlet filter assembly, heater assembly, plenum assembly, special cable assembly, junction box assembly and electrical box, for good condition; replace if necessary.

8. Inspect stabilizer and mounting plates for corrosion, breaks, and good condition; clean, repair or replace as necessary.

9. Inspect check valve assemblies for smooth seating surfaces, cleanliness, bent or distorted springs, and freedom of operation; replace as necessary.

6-69. REPAIR.

6-70. Repair of the oxygen concentrator is limited to patching of the shroud assembly, replacing defective component parts, minor repairs (small dents, scratches, abrasions, nicks, etc.) of tubing. To make minor repairs, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive, Clear	DC3145
As Required	Lacquer, Cellulose, Jet Black	MIL-L-7178
As Required	Cloth, Laminated, Vinyl-Nylon	MIL-C-43006E NIIN 00-926-1585
As Required	Tape, Hook	MIL-F-21840 NIIN 00-454-9063
As Required	Tape, Pile	MIL-F-21840 NIIN 00-978-0113
As Required	Wool, Aluminum	—

1. Tubing assemblies with minor dents not causing flow restriction are considered serviceable. Small scratches, abrasions, and nicks can be smoothed with a burnishing tool or aluminum wool.

2. To avoid burnishing the same area more than once, each burnished area shall be identified by a painted band. Color bands shall be black in color and shall cover an area not less than 2 inches nor more than 3 inches in length.

3. Tubing nicked, abraded, or scratched in an area previously identified as burnished shall be condemned.

4. To repair the shroud assembly, proceed as follows:

a. Cut a piece of shroud material to the desired length and width.

b. Clean the affected area of shroud assembly.

c. Apply adhesive in accordance with container directions and apply patch to shroud area.

d. Replace damaged hook or pile tape as necessary.

6-71. ASSEMBLY.

NOTE

Equivalent tools or materials may be used as long as the integrity of the test, procedures or equipment is not compromised.

Coat all preformed packings with Krytox 240 AC prior to installing unless otherwise noted.

6-72. MOLECULAR SIEVE BED ASSEMBLY INSTALLATION.

To install the Molecular Sieve Bed Assemblies, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	Loctite 262
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
8	Bolt, Cut-off	Fabricate IAW figure 6-14A from AN-5-24 NIIN 00-151-0917

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-14 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packings (42) and (43) and install in molecular sieve bed assemblies (32) and (33).

2. Turn molecular sieve bed assemblies (32) and (33) upside down.

a. Install 8 cut-off bolts (figure 6-14A) into sieve beds (32) and (33).

b. Align two spacer cushions (32A) with 8 cut-off bolts and install spacer cushions (32A) onto sieve beds (32) and (33).

c. Align mounting plate assembly (44) with 8 cut-off bolts and install mounting plate assembly (44) onto sieve beds (32) and (33).

NOTE

Remove one cut-off bolt at a time when securing mounting plate assembly (44) to sieve bed assemblies (32) and (33) with machine screws (41), to prevent two spacer cushions (32A) from becoming misaligned with sieve beds (32) and (33).

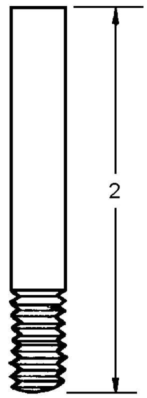

Figure 6-14A. Cut-off Bolt

3. Apply sealant compound to first two threads of eight machine screws (41). Secure molecular sieve bed assemblies (32) and (33) to mounting plate assembly (44). Torque machine screws 130 to 135 in-lb.

4. Apply Krytox 240 AC to preformed packing (39) and (40) and install in molecular sieve beds (32) and (33).

5. Install metallic tube assembly (37) and metallic bent tube assembly (38) in molecular sieve bed assemblies (32) and (33) and secure with four socket head cap screws (34), lockwashers (35), and flat washers (36). Torque socket head cap screws to 2.0 to 2.2 in-lb.

6. Apply sealing compound (Loctite 222) to first two threads of two machine screws (29).

7. Install L-bracket (31) on molecular sieve bed assemblies (32) and (33) and secure with two machine screws (29) and lockwashers (30).

6-73. SPECIAL CABLE ASSEMBLY INSTALLATION. To install the Special Cable Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive Sealant, Silicone, RTV 3145	GS-06F-12702 NIIN 00-145-0020
As Required	Alcohol, Isopropyl	TT-I-735 NIIN 00-655-8366
As Required	Compound Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sleeving, Insulation	M23053/5-103-0

Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Sleeving, Insulation	M23053/5-104-0
As Required	Sleeving, Insulation	M23053/5-106-0
As Required	Sleeving, Insulation	M23053/5-109-0
As Required	Solder	QQ-S-571, Comp SN63
As Required	Tape, Anti-seize	MIL-T-27730A

Support Equipment Required

Quantity	Description	Reference Number
1	Brush	—
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002
1	Pliers, Cutters, Full Flush	Maximum Excelta, #119E1
1	Pliers, Flat Nose	Utica, #20-41/2 GCS
1	Pliers, Round Nose, Extra Fine	Utica, #U431
1	Soldering Iron	—
1	Stripper, Solid Wire	Ideal #45-125
1	Stripper, Standard Wire	Ideal #45-121
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-14 unless otherwise noted.

1. Place special cable assembly (28) on concentrator assembly as shown.

2. Connect cable assembly electrical connector J2 (1) to junction box assembly connector J2 (2).

NOTE

Index numbers in this paragraph only refer to figure 6-13.

3. Secure junction box assembly (2) to junction box bracket (8) with two sockethead cap screws (5), spring lockwashers (6), and flat washers (7). Torque socket head cap screws to 5.0 to 7.5 in-lb.

NOTE

Index numbers refer to figure 6-14 unless otherwise noted.

4. (Reference figure 6-15 for wiring connection.) Slide three insulation sleeves (P/N M23053/5-103-0) 2.0 to 2.5 inches long over three individual leads RED, WHT and YEL located at cable assembly electrical connector (5). Slide back from lead connectors until ready to heat shrink.

5. Slide insulation sleeving (P/N M23053/5-106-0) 1.7 to 2.25 inches long over all three leads RED, WHT and YEL located at cable assembly electrical connector (5). Slide back from lead connectors until ready to heat shrink.

6. Slide insulation sleeving (P/N M23053/5-109-0) 2.0 to 2.25 inches long over entire cable assembly electrical connector (5). Slide back from connector until ready to heat shrink.

7. Mate the three connectors on the RED (male), WHT (female), and YEL (female) wires of the cable assembly electrical connector (5) to the RED (female), WHT (male), and YEL (male) wire connectors of the rotary valve electrical connector (4).

WARNING

The heat gun can generate extreme heat that can cause severe burns.

8. Slide insulating sleeving (P/N M23053/5-103-0), previously installed, over each of three leads and secure by shrinking in place with heat gun.

9. Slide insulation sleeving (P/N M23053/5-106-0), previously installed, over all three leads and secure by shrinking in place.

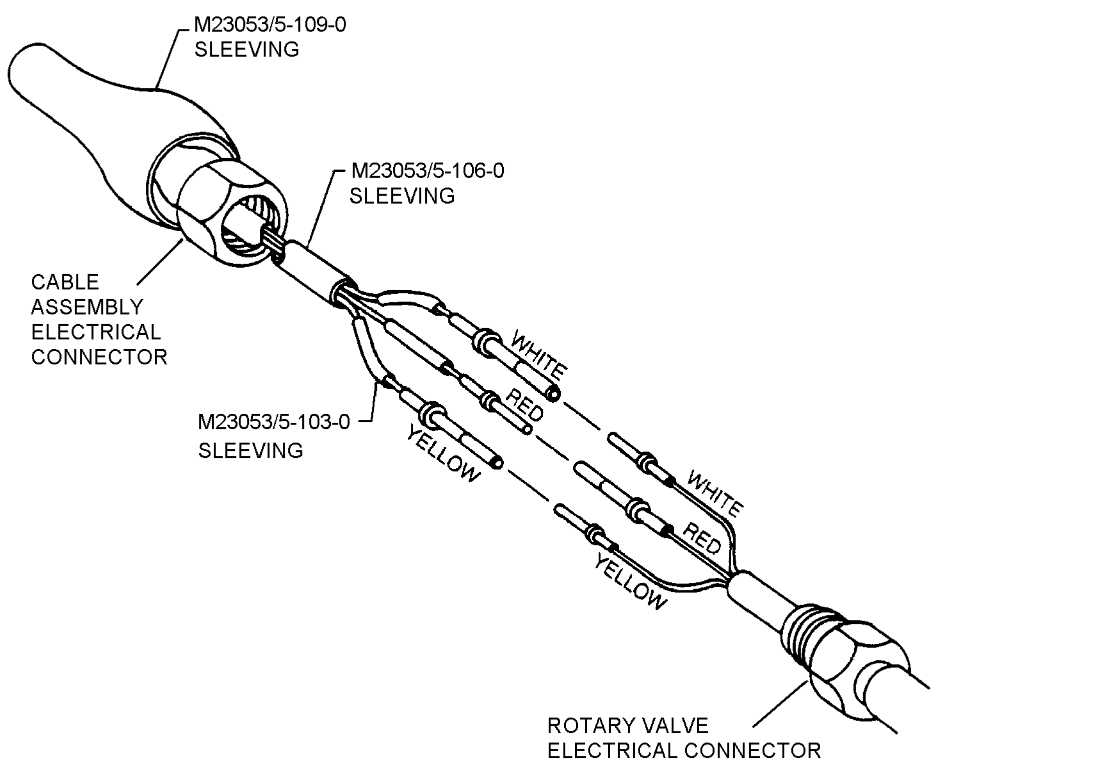

Figure 6-15. Wiring Connection for Cable Assembly Electrical Connector to Rotary Valve Electrical Connector

10. Connect rotary valve electrical connector (4) to cable assembly electrical connector (5).

11. Slide insulation sleeving (P/N M23053/5-109-0), previously installed, over both electrical connectors (4) and (5) and secure by shrinking in place.

12. Apply Krytox 240 AC to preformed packing (10) and install on cable assembly EMI cover (8).

13. Wrap threads of thermal resistor (9) with anti-seize tape and install in inlet filter assembly (7). Torque thermal resistor to 60 to 125 in-lb. Cut lead wires on thermal resistor to 0.5 in.

14. Slide insulation sleeving (P/N M23053/5-103-0) over the BLK and WHT wires protruding from cable assembly EMI cover (8). Slide back until connection is made and wires are soldered.

15. Using mechanical hand wire strippers, strip insulation from BLK and WHT wire ends approx. 3/16 in, also strip the two WHT wire leads extending from the thermal resistor (9) approx. 3/16 inch.

16. Tin the exposed BLK and WHT stranded wire ends by heating the stripped ends with the soldering iron and applying solder until solder penetrates to the inner strands of wire, but does not obscure the wire contour of the individual wire strands. The entire stripped end shall be tinned to within 1/16 ±1/32 inch from the end of the insulation.

17. (Reference figure 6-16 for wiring connection.) With round nose pliers, form J-hooks on the end of all four wires.

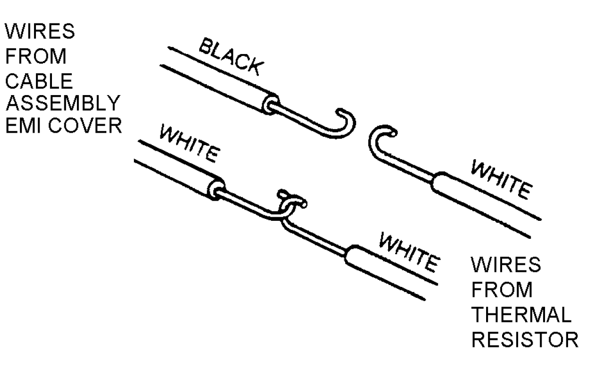

Figure 6-16. Cable Assembly EMI Cover Wires

18. Interlock the BLK and WHT wire J-hooks with the two WHT wire J-hooks. If necessary, use flat nose pliers and gently press J-hooks together for a tight connection.

19. After connection is made, examine for excess wire extending from J-hooks and carefully trim any excess with wire cutters.

20. Position connection so that the soldering iron tip can be placed beneath. Heat the J-hook connection and apply solder until the J-hook to J-hook soldering operation is complete. Repeat process with the second connection.

21. Clean flux residue from the soldered connections with alcohol and brush.

WARNING

The heat gun can generate extreme heat that can cause severe burns.

22. Apply silicone adhesive sealant to the soldered connections to seal. Pull insulation sleeving over the soldered connections and, using heat gun, shrink insulation sleeving in place.

23. Install cable assembly EMI cover (8) in inlet filter assembly (7).

24. Install two setscrews (6) in top of inlet filter assembly (7) Torque setscrews to 2.0 to 2.2 in-lb.

25. Apply sealant compound to first two threads of thermostatic switch (14) and install in heater assembly (15).

26. Slide insulation sleeving (P/N M23053/5-104-0) over all three BLU, BRN and VIO wires protruding from switch cover (13). Slide sleeving back from wire ends until connection is made.

27. Strip wire insulation approx. 1/4 inch from all three wires with mechanical hand wire strippers.

28. Tin the exposed ends of all three wire ends by heating the stripped ends with the soldering iron and applying solder until solder penetrates to the inner strands of wire, but does not obscure the wire contour of the individual wire strands. The entire stripped end shall be tinned to within 1/16 ±1/32 inch from the end of the insulation.

29. (See figure 6-17 for the soldering connection.) Form a J-hook on the end of all three wires using round nose pliers.

30. Slide the J-hooks from switch cover wires through the eyelets in the leads of thermostatic switch (14) as follows: BRN to S1-1, VIO to S1-2 and BLU to S1-3. If necessary, use flat nose pliers and gently press J-hook to eyelet for a tight connection.

31. After connection is made, examine for excess wire extending from J-hooks and aim any excess with wire cutters.

32. Position connection so that the soldering iron tip can be placed underneath. Heat the connection and apply solder until the J-hook to lead eyelet soldering process is complete. Repeat for the second and third connections.

33. Clean flux residue from soldered connections with alcohol and a brush.

WARNING

The heat gun can generate extreme heat that can cause severe burns.

34. Slide insulation sleeving over the soldered connections and, using heat gun, shrink insulation sleeving in place. Seal by applying silicone adhesive sealant to soldered connection.

35. Install switch cover (13) with two socket head cap screws (11) and lockwashers (12). Torque 4.0 to 4.5 in-lb.

36. Slide insulation sleeving (P/N M23053/5-104-0) over two electrical leads (16) protruding from the electrical box cover (21). Slide sleeving away from leads until connection is completed.

37. Mate the two female electrical leads (16) to heater assembly (15) male leads that protrude from nonmetallic grommet (17).

WARNING

The heat gun can generate extreme heat that can cause severe burns.

38. Slide insulation sleeving over connection and, using the heat gun, shrink insulation sleeving in place.

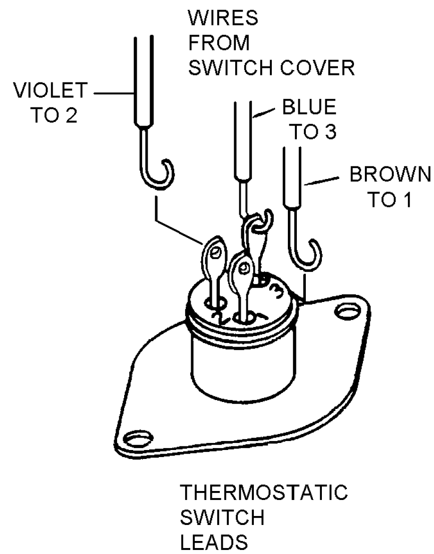

Figure 6-17. Switch Cover Wires

39. Install J1 electrical connector (45) and secure with four socket head cap screws (23), flat washers (24), and electrical retaining plate (25) to electrical box (22). Torque socket head cap screws to 20 to 25 in-lb.

40. Loop wires inside electrical box (22) and secure with electrical tiedown strap (26).

41. Install electrical box cover (21) on electrical box (22) and secure with three socket head cap screws (18), lockwashers (19), and flat washers (20). Torque socket head cap screws to 20 to 25 in-lb.

42. Secure special cable assembly to concentrator assembly with electrical tiedown straps (3) and (27).

6-74. HEATER ASSEMBLY INSTALLATION. To install the Heater Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive Sealant, Silicone, RTV 3145	GS-06F-12702 NIIN 00-145-0020

Materials Required (Cont)

Quantity	Description	Reference Number
As Required	Alcohol, Isopropyl	TT-I-735 NIIN 00-655-8366
As Required	Compound Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sleeving, Insulation	M23053/5-104-0
As Required	Solder	QQ-S-571, Comp SN63

Support Equipment Required

Quantity	Description	Reference Number
1	Brush	—
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002
1	Pliers, Cutters, Full Flush	Maximum Excelta, #119E1
1	Pliers, Flat Nose	Utica, #20-41/2 GCS
1	Pliers, Round Nose, Extra Fine	Utica, #U431
1	Soldering Iron	—
1	Stripper, Solid Wire	Ideal #45-125
1	Stripper, Standard Wire	Ideal #45-121
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Install heater assembly (23) ensuring leads (27) are installed through nonmetallic grommet (17, figure 6-14).

2. Secure cushion disk (26) and heater assembly (23) to mounting plate (4) with two screws (25).

3. Slide insulation sleeving over two heater assembly leads (27). Slide sleeving back from leads until connection is made.

4. Mate the two female electrical leads (16, figure 6-14) to heater assembly (27) male leads.

WARNING

The heat gun can generate extreme heat that can cause severe burns.

5. Using heat gun, shrink insulation sleeving in place.

6. Apply sealant compound to first two threads of thermostatic switch (22) and install in heater assembly (23).

7. Slide insulation sleeving over all three BLU, BRN and VIO wires protruding from switch cover (21). Slide sleeving back from wire ends until connection is made.

8. Strip wire insulation approx. 1/4 in. from all three wires with mechanical hand wire strippers.

9. Tin exposed ends of all three wire ends by heating the stripped ends with the soldering iron and applying solder until solder penetrates to the inner strands of wire, but does not obscure the wire contour of the individual wire strands. The entire stripped end shall be tinned to within 1/16 $\pm$1/32 inch from the end of the insulation.

10. (See figure 6-17 for soldering connection.) Form a J-hook on the end of all three wires using round nose pliers.

11. Slide the J-hooks from switch cover wires through the eyelets in the leads of thermostatic switch (22) as follows: BRN to S1-1, VIO to S1-2 and BLU to S1-3. If necessary, use flat nose pliers and gently press J-hook to eyelet for a tight connection.

12. After connection is made, examine for excess wire extending from J-hooks and trim any excess with wire cutters.

13. Position the connection so that the soldering iron tip can be placed underneath. Heat the connection and apply solder until the J-hook to lead eyelet soldering process is complete. Repeat for the second and third connections.

14. Clean flux residue from soldered connections with alcohol and a brush.

WARNING

The heat gun can generate extreme heat that can cause severe burns.

15. Slide insulation sleeving over the soldered connections and, using heat gun, shrink insulation sleeving in place. Seal by applying silicone adhesive sealant to soldered connection.

16. Install switch cover (21) and secure with two socket head cap screws (19) and lockwashers (20). Torque to 4.0 to 4.5 in-lb.

17. Apply Krytox 240 AC to preformed packing (24) and install on heater assembly (23).

6-75. INLET FILTER ASSEMBLY. To assemble the Inlet Filter Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	Loctite 290

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Install tube fitting (15) in filter mount base (34). Torque tube fitting to 1.5 to 2.5 in-lb.

2. Apply sealant compound (Loctite 290) to threads of threaded adapter (42), and install threaded adapter on inlet filter housing (32). Torque threaded adapter to 140 to 160 in-lb.

3. Install nonmetallic tubing (18) on tube fitting (15).

6-76. INLET FILTER ASSEMBLY INSTALLATION. To install the Inlet Filter Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Adhesive Sealant, Silicone, RTV 3145	GS-06F-12702 NIIN 00-145-0020
As Required	Compound, Sealant	Loctite 290
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sleeving, Insulation	M23053/5-103-0
As Required	Solder	QQ-S-571, Comp SN63

Support Equipment Required

Quantity	Description	Reference Number
1	Brush	—
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002
1	Pliers, Cutters, Full Flush	Maximum Excelta, #119E1
1	Pliers, Flat Nose	Utica, #20-41/2 GCS
1	Pliers, Round Nose, Extra Fine	Utica, #U431
1	Soldering Iron	—
1	Stripper, Solid Wire	Ideal #45-125
1	Stripper, Standard Wire	Ideal #45-121
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packing (24) and install on heater assembly (23).

2. Install inlet filter housing (32) on heater assembly (23) and secure with two set screws (9), torque screws to 2.0 to 2.2 in-lb.

3. Wrap threads of thermal resistor (12) with anti-seize tape and install in inlet filter housing (32). Torque thermal resistor to 60 to 125 in-lb. Cut lead wires on thermal resistor to 0.5 in.

4. Slide insulation sleeving over BLK and WHT wires protruding from cable assembly EMI cover (11). Slide back until connection is made and wires are soldered.

5. Using mechanical hand wire strippers, strip insulation from BLK and WHT wire ends approximately 3/16 inch, also strip the two WHT wire leads extending from the thermal resistor (12) approximately 3/16 inch.

6. Tin the exposed BLK and WHT stranded wire ends by heating the stripped ends with the soldering iron and applying solder until solder penetrates to the inner strands of wire, but does not obscure the wire contour of the individual wire strands. The entire stripped end shall be tinned to within 1/16 ±1/32 inch from the end of the insulation.

7. (Refer to figure 6-16 for soldering connection.) With round nose pliers, form J-hooks on the end of all four wires.

8. Interlock the BLK and WHT wire J-hooks with the two WHT wire J-hooks. If necessary, use flat nose pliers and gently press J-hooks together for a tight connection.

9. After connection is made, examine for excess wire extending from J-hooks and carefully trim any excess with wire cutters.

10. Position connection so that the soldering iron tip can be placed beneath. Heat the J-hook connection and apply solder until the J-hook to J-hook soldering operation is complete. Repeat process with the second connection.

11. Clean flux residue from the soldered connections with alcohol and brush.

WARNING

The heat gun can generate extreme heat that can cause severe burns.

12. Pull insulation sleeving over the soldered connections. Using heat gun, shrink insulation sleeving in place. Seal by applying silicone adhesive sealant to soldered connections.

13. Apply Krytox 240 AC to preformed packing (13) and install on cable assembly EMI cover (11).

14. Install cable assembly EMI cover (11) in inlet filter housing (32).

15. Install two setscrews (9) in top of inlet filter assembly (10), torque screws to 2.0 to 2.2 in-lb.

6-77. FILTER ELEMENT TUBE INSTALLATION. To install the Filter Element Tube, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Lockwire	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Tube Pliers, Inlet Filter Drain	3309311-1 (CAGE 99251)

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packings (38), (39), (40), and (41) and install.

1A. Install filter element tube (33) and seat (32B) into water trap (32A).

2. Install filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), helical retainers (35 and 36), and helical spring (37) on filter mount base (35).

3. Push down on top of water trap (32A) and while holding against the spring tension, tilt water trap and filter housing sleeve (31) toward the back of the concentrator and into position beneath inlet filter housing (32).

4. When the ID of water trap (32A) is aligned with the locator on the top of inlet filter housing (32), release water trap and allow spring tension to seat water trap on inlet filter housing.

5. Install filter mount base (34) and filter housing sleeve (31) and all contents on inlet filter housing (32).

6. Install special bolt (16), helical retainer (29) and support cup (30) as an assembly, from bottom of concentrator assembly.

CAUTION

Nuts are to be lock-wired in such a way that if they were to be loosened, the lock-wire would tighten.

7. Connect lockwire (17) and tie fasteners in accordance with MS33540.

8. Using inlet filter drain tube pliers (P/N 3309311-1) install nonmetallic tube (18) onto tube fitting (15) and rotary valve vent tube hose barb.

6-78. JUNCTION BOX ASSEMBLY INSTALLATION. To install the Junction Box Assembly, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-13 unless otherwise noted.

1. Install two damping pads (28) on junction box assembly (2).

2. Secure junction box assembly (2) to mounting plate assembly (4) with four machine screws (3). Torque machine screws to 20 to 25 in-lb.

3. Connect cable assembly electrical connector J2 (1) to the electrical connector of the junction box assembly (2).

4. Secure junction box assembly (2) to junction box bracket (8) with two sockethead cap screws (5), spring lockwashers (6), and flat washers (7). Torque socket head cap screws to 5.0 to 7.5 in-lb.

6-79. OXYGEN FITTING INSTALLATION. To install the Oxygen Fitting, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packing (6) and install in oxygen fitting (5).

2. Apply sealant compound to first two threads of three screws (18).

3. Install oxygen fitting (5) on mounting plate assembly (19) and secure with three screws (18). Torque screws to 20 to 25 in-lb.

4. Install metallic tube assembly (4) in oxygen fitting (5) and secure with two socket head cap screws (1), lockwashers (2), and flat washers (3). Torque socket head cap screws to 4.0 to 5.0 in-lb.

6-80. CHECK VALVE ASSEMBLY INSTALLATION. To install Check Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Install two check valves (25).

2. Apply Krytox 240 AC to four preformed packings (26) and (27) and install in plenum (24).

3. Apply Krytox 240 AC to two preformed packings (13) and install in molecular sieve bed assemblies (10) and (11).

4. Install manifold (23) and secure to plenum (24) with three machine screws (21), and lockwashers (22).

5. Apply sealant compound to first two threads of two special bolts (20). Install and secure special bolts through manifold (23) into plenum (24).

6. Slide two sleeve bushings (8) into molecular sieve bed assemblies (10) and (11). This procedure will secure plenum assembly (9) to molecular sieve bed assemblies (10) and (11).

7. Install two spring tension clips (7) on sleeve bushings (8).

6-81. PLENUM ASSEMBLY. To assemble the Plenum Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound, Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Install two check valves assemblies (25) in plenum (24).

2. Apply Krytox 240 AC to preformed packings (36) and (37), two preformed packings (26) and two preformed packings (27).

3. Install preformed packing (36) and preformed packing (37) in plenum cover (31).

4. Install two preformed packings (27) and two preformed packings (26) in plenum (24).

5. Install fluid filtering disk (34) and fluid filter element (35) on plenum cover (31) and secure with machine screw (32) and lockwasher (33).

6. Install plenum cover (31), with assembled parts, on plenum (24) and secure with three machine screws (30). Torque screws to 4.0 to 5.0 in-lb.

7. Apply Krytox 240 AC to two machine screws (29) and two preformed packings (12).

8. Install two machine screws (29) and two preformed packings (12) in manifold (23). Torque machine screws to 21 to 25 in-lb.

9. Install manifold (23) and secure to plenum (24) with three machine screws (21), and lockwashers (22).

10. Apply sealant compound to first two threads of two special bolts (20). Install and secure special bolts through manifold (23) into plenum (24).

11. Apply sealant compound to first two threads of electrical-mechanical post (28). Install post (28) in plenum (24).

6-82. PLENUM ASSEMBLY INSTALLATION. To install the Plenum Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-12 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packing (17), two preformed packings (12) and two preformed packings (13).

2. Install preformed packing (17) and two preformed packings (12) in plenum assembly (9). Install two preformed packings (13) in molecular sieve bed assemblies (10) and (11).

3. Install plenum assembly (9) on metallic tube assembly (4) and secure with two socket head cap screws (14), lockwashers (15), and flat washers (16). Torque socket head cap screws to 4.0 to 4.5 in-lb.

4. Apply Krytox 240 AC to preformed packing (6) and install in oxygen fitting (5).

5. Install sleeve bushings (8) into plenum assembly (9).

6. Carefully install the plenum assembly (9) with metallic tube assembly, attached, in oxygen fitting (5).

7. Slide two sleeve bushings (8) into molecular sieve bed assemblies (10) and (11). This procedure will secure plenum assembly (9) to molecular sieve bed assemblies (10) and (11).

8. Install two spring tension clips (7) on sleeve bushings (8).

9. Secure metallic tube assembly (4) to oxygen fitting (5) with two socket head cap screws (1), lockwashers (2), and flat washers (3). Torque socket head cap screws to 4.0 to 4.5 in-lb.

6-83. ROTARY VALVE ASSEMBLY INSTALLATION. To install the Rotary Valve Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound Sealant	Loctite 222
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sleeving, Insulation	M23053/5-103-0
As Required	Sleeving, Insulation	M23053/5-106-0
As Required	Sleeving, Insulation	M23053/5-109-0

Support Equipment Required

Quantity	Description	Reference Number
1	Heater, Gun Type	MIL-H-45193C (CAGE 81349) NIIN 00-561-1002
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-11 unless otherwise noted.

1. Position motor mount halves (35) as shown. Ensure electrical connector (29) is placed through access hole in motor mount half. Install motor mount halves (35) on rotary valve assembly (5) and loop clamp (36), secure with hose clamps (33) and (34).

2. Apply Krytox 240 AC to preformed packing (6) and two preformed packings (26), install in rotary valve assembly (5).

3. Apply Krytox 240 AC to two preformed packings (25) and install in molecular sieve bed assemblies (24).

4. Secure metallic bent tube assembly (20) to rotary valve assembly (5) with two socket head cap screws (17), lockwashers (18), and flat washers (19). Torque socket head cap screws to 2.0 to 2.2 in-lb.

5. Repeat steps 3 and 4 for the other metallic tube assembly (27).

6. Apply Krytox 240 AC to preformed packing (15) and install in the inlet filter assembly (14).

7. Apply Krytox 240 AC to preformed packing (40).

8. Install preformed packing (40) and pressure reducer assembly (39) on rotary valve assembly (5).

9. Place rotary valve assembly (5), with pressure reducer assembly installed, in mounting position and secure ground lug (45) to mounting plate assembly (32) with socket head cap screw (42), lockwasher (43), and flat washer (44). Torque socket head cap screw to 10.0 to 12.0 in-lb.

10. Apply sealant compound to first two threads of two machine screws (31). Secure rotary valve assembly (5) to mounting plate assembly (32) with two machine screws (31). Torque screws to 75 to 80 in-lb.

NOTE

If new rotary valve assembly P/N 1657420-1 is being installed new metallic tube (rotary valve vent tube) P/N 1657867-1 (8, figure 6-20) must be installed when performing step 11.

11. Install metallic tube assembly (4) on rotary valve assembly (5) and secure with two socket head cap screws (1), lockwashers (2), and flat washers (3). Torque screws to 2.0 to 2.2 in-lb.

NOTE

If new rotary valve assembly P/N 1657420-1 is installed, perform step 11A.

11A. Using inlet filter drain pliers (P/N 3309311-1), install one end of non-metallic tube (10, figure 6-22) to inboard hose barb on metallic tube (4). Route other end of non-metallic tube down and between rotary valve and sieve beds and install non-metallic tube on hose barb located on bottom corner of rotary valve assembly.

12. Install metallic bent tube assembly (20) in molecular sieve bed assembly (24) and secure with two socket head cap screws (21), lockwashers (22), and flat washers (23). Torque socket head cap screws to 2.0 to 2.2 in-lb.

13. Repeat steps 11 and 12 for the other metallic tube assembly (27).

14. Install metallic bent tube assembly (10) to inlet filter assembly (14) with two socket head cap screws (11), lockwashers (12), and flat washers (13). Torque screws to 2.0 to 2.2 in-lb.

15. (Refer to figure 6-15 for wiring connections.) Slide three insulation sleeves (P/N M23053/5-103-0) 2.0 to 2.5 inches long over three individual leads RED, WHT and YEL located at cable assembly electrical connector (30). Slide back from lead connectors until ready to heat shrink.

16. Slide insulation sleeving (P/N M23053/5-106-0) 1.7 to 2.25 inches long over all three leads RED, WHT and YEL located at cable assembly electrical connector (30). Slide back from lead connectors until ready to heat shrink.

17. Slide insulation sleeving (P/N M23053/5-109-0) 2.0 to 2.25 inches long over entire cable assembly electrical connector (30). Slide back from connector until ready to heat shrink.

18. Mate the three connectors on the RED (male), WHT (female), and YEL (female) wires of the cable assembly electrical connector (30) to the RED (female), WHT (male), and YEL (male) wire connectors of the rotary valve electrical connector (29).

WARNING

The heat gun can generate extreme heat that can cause severe burns.

19. Slide insulating sleeving (P/N M23053/5-103-0), previously installed, over each of three leads and secure by shrinking in place with heat gun.

20. Slide insulation sleeving (P/N M23053/5-106-0), previously installed, over all three leads and secure by shrinking in place.

21. Connect rotary valve electrical connector (29) to cable assembly electrical connector (30).

22. Slide insulation sleeving (P/N M23053/5-109-0), previously installed, over cable assembly electrical connectors (30) and rotary valve electrical connector (29) and secure by shrinking in place.

23. Secure electrical connectors (29) and (30) with electrical tiedown strap (28).

6-84. PRESSURE REDUCER ASSEMBLY INSTALLATION. To install the Pressure Reducer Assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-11 unless otherwise noted.

1. Apply Krytox 240 AC to preformed packings (15) and (16) and install in inlet filter assembly (14) and pressure reducer assembly (39).

2. Position metallic bent tube assembly (10) and secure to pressure reducer assembly (39) with two sockethead cap screws (7), spring lockwashers (8), and flat washers (9). Torque screws to 4.0 to 4.5 in-lb.

3. Install hex nut (47) and electrical-mechanical post (40).

4. Apply Krytox 240 AC to preformed packing (40).

5. Install preformed packing (40) and pressure reducer assembly (39) on rotary valve assembly (5), ensure metallic bent tube assembly is inserted in inlet filter assembly (14), and secure with two socket head cap screws (37) and lockwashers (38). Torque screws to 20 to 25 in-lb.

6. Secure metallic bent tube assembly (10) to inlet filter assembly (14) with two socket head cap screws (11), lockwashers (12), and flat washers (13). Torque screws to 2.0 to 2.2 in-lb.

6-85. SHROUD ASSEMBLY INSTALLATION. To install the Shroud Assembly, proceed as follows:

1. Install concentrator shroud on mounting plate.

2. Install concentrator shroud on stabilizer plate.

3. Install mounting plate (paragraph 6-86).

4. Install stabilizer plate (paragraph 6-87).

5. Install and secure concentrator shroud (34, figure 6-9).

6-86. MOUNTING PLATE INSTALLATION. To install the Mounting Plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound Sealant	Loctite 222
As Required	Lockwire	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-10 unless otherwise noted.

1. Apply sealant compound to first two threads of machine screw (26). Install strap assembly (28) and secure with machine screw (26) and flat washer (27). Torque machine screw to 10.0 to 12.5 in-lb.

2. Apply sealant compound to first two threads of machine screw (23). Install strap assembly (25) and secure with machine screw (23) and flat washer (24). Torque machine screw to 10.0 to 12.5 in-lb.

3. Install machine screw (19) and flat washer (20). Torque machine screw to 10.0 to 12.5 in-lb.

4. Align holes and install ring spacers (22), cushion disk (18) concentrator shroud (21), and mounting plate assembly (1).

5. Secure ground terminal (17) to mounting plate assembly (1) with socket head cap screw (14), lockwasher (15), and flat washer (16). Torque socket head cap screw to 10.0 to 12.5 in-lb.

6. Apply sealant compound to first two threads of three machine screws (12). Ensure shroud is not pinched between mounting plate and any components and secure mounting plate assembly (1) to electrical box (13) with three machine screws (12). Torque machine screws to 20 to 25 in-lb.

7. Apply sealant compound to first two threads of two machine screws (10). Secure mounting plate assembly (1) to heater assembly (11) with two machine screws (10). Torque machine screws to 75 to 80 in-lb.

8. Apply sealant compound to first two threads of three machine screws (8). Secure mounting plate assembly (1) to oxygen fitting (9) with three machine screws (8). Torque machine screws to 20 to 25 in-lb.

9. Apply sealant compound to first two threads of two machine screws (6). Secure mounting plate assembly (1) to rotary valve assembly (7) with two machine screws (6). Torque machine screws to 75 to 80 in-lb.

10. Secure mounting plate assembly (1) to junction box assembly (5) with four machine screws (4). Torque machine screws to 20 to 25 in-lb.

11. Apply sealant compound to first two threads of eight machine screws (2). Secure mounting plate assembly (1) to molecular sieve bed assemblies (3) with eight machine screws (2). Torque machine screws to 130 to 135 in-lb.

12. Turn concentrator over so it is sitting on mounting plate assembly (1).

13. Install and secure lockwire to machine screw (19) and special bolt (16, figure 6-13) in accordance with MS33540.

14. Install and secure concentrator shroud (3, figure 6-9).

6-87. STABILIZER PLATE INSTALLATION. To install the Stabilizer Plate, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound Sealant	Loctite 222
As Required	Lockwire	MS20995C20
As Required	Setscrew	MS51963-30
As Required	Setscrew	MS51963-55
As Required	Setscrew	MS51964-71

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 in-lb	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Index numbers refer to figure 6-9 unless otherwise noted.

1. Temporarily install three setscrews (MS51963-30), to retain spacers (10) on junction box bracket (9); setscrew (MS51963-55), to retain flat washers (17) on vent tube support (16); four setscrews (MS51963-55), to retain flat washers (21) on electrical-mechanical posts (20); and two setscrews (MS51964-71), to retain heater spacers (28), nonmetallic washers (29), and flat washers (30) on heater assembly (27).

2. Remove from peg board and install spacers (10) on junction box bracket (9). Repeat for shims (31) on plenum assembly (13), flat washers (17) on vent tube support (16), flat washers (21) on electrical-mechanical posts (20), heater spacers (28), nonmetallic washers (29) and flat washers (30) on heater assembly (27).

3. Remove from peg board and install flat washers (33) and secure with electrical-mechanical posts (32) on inlet filter assembly (24).

4. Install concentrator shroud (34) and stabilizer plate (5) on concentrator.

5. Apply sealant compound to first two threads of four machine screws (4) and secure stabilizer plate (5) to molecular sieve bed assemblies (6). Torque screws to 75 to 80 in-lb.

6. Apply sealant compound to first two threads of two hexagon cap screws (25). Remove two setscrews (MS51964-71) aligning stabilizer plate (5), heater spacers (28), nonmetallic washers (29), and flat washers (30) with heater assembly (27) and secure with two hexagon cap screws (25) and flat washers (26). Torque hexagon cap screws to 75 to 80 in-lb. Using lockwire, wire tie fasteners in accordance with MS33540.

7. Install two hex nuts (22) and flat washers (23) securing stabilizer plate (5) to inlet filter assembly (24). Torque nuts to 27.5 to 30 in-lb. Using lockwire, wire tie fasteners in accordance with MS33540.

8. Apply sealant compound to first two threads of four machine screws (18). Remove four setscrews (MS51963-55) aligning stabilizer plate (5), flat washers (21), electrical-mechanical posts (20) and secure with four machine screws (18) and flat washers (19). Torque machine screws to 10.0 to 12.5 in-lb.

9. Apply sealant compound to first two threads of machine screw (14). Remove setscrew (MS51963-55) aligning stabilizer plate (5), flat washers (17), vent tube support (16) and secure with machine screw (14) and flat washer (15). Torque machine screw to 10.0 to 12.5 in-lb.

CAUTION

Do not over torque, damage to electrical-mechanical posts may occur.

10. Install three hex nuts (11) and flat washers (12) securing stabilizer plate (5) to plenum assembly (13). Torque hex nuts to 4.5 to 5.0 in-lb. Using lockwire, wire tie fasteners in accordance with MS33540.

11. Apply sealant compound to first two threads of machine screws (7). Remove three setscrews (MS51963-30) aligning stabilizer plate (5), spacers (10), junction box bracket (9) and secure with three machine screws (7) and flat washers (8). Torque machine screws to 5.0 to 7.5 in-lb.

12. Install webbing strap (2) and secure with cotter pins (1).

13. Install and secure concentrator shroud (3).

6-88. SCHEDULED MAINTENANCE.

6-89. REPLACEMENT OF INLET FILTER TUBE ELEMENT. Prior to testing or repair of the GGU-12/A oxygen concentrator or after 400 flight hours of service life, remove and replace the Inlet Filter Tube Element. At this time check the part number of the inlet filter assembly (it will be marked on the housing). If the part number is 1647710-1, the part is obsolete and it will be updated to the 1647710-2 configuration by performing the following:

Materials Required

Quantity	Description	Reference Number
As Required	Lockwire	MS20995C20
As Required	Krytox 240 AC	NIIN 00-961-8995 (CAGE 73925)

NOTE

The inlet filter tube element shall be replaced with an RFI replacement.

Equivalent tools may be used as long as the integrity of the test, procedure or equipment is not compromised.

Index numbers refer to figure 6-13 unless otherwise specified.

1. Cut lockwire (17) and remove special bolt (16) from bottom of concentrator assembly.

2. Remove outer helical retainer (29) and support cup (30).

3. Grasp filter housing sleeve (31) and push down to separate filter housing sleeve from inlet filter housing (32) and expose water trap (32A) with seat (32B), and filter element (33) attached.

4. To allow for removal of water trap (32A) and disassembly of the filter housing sleeve (31) from the filter base (34), insert a small bladed screwdriver above metal on the top of water trap (32A). Push down on the top of water trap (32A) and while holding against the spring tension, tilt water trap and filter housing sleeve toward the front of the concentrator and out from under inlet filter housing (32).

5. Remove filter mount base (34) with filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), and inlet filter housing (32) with all attached parts.

6. Remove filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), helical retainers (35 and 36), and helical spring (37) from filter mount base (34).

7. Remove and discard seat (32B) and filter element tube (33) from water trap (32A).

NOTE

Water trap (32A) and seat (32B) are new items and must be ordered and installed during reassembly of the inlet filter assembly.

8. Remove and discard preformed packings (38), (39), (40), and (41).

9. If inlet filter assembly housing (32) is marked P/N 1647710-2, proceed to next step. If the P/N is 1647710-1 and/or it has been determined it is necessary to make the modifications discussed in paragraph 6-18, refer to paragraph 6-90.

10. Ensure the helical retainer (36), helical spring (37), and special bolt (16) are the -2 configuration parts.

11. Apply Krytox 240 AC to preformed packings (38), (39), (40), and (41), and install.

12. Install filter element tube (33) and seat (32B) into water trap (32A).

13. Install filter housing sleeve (31), water trap (32A) with seat (32B) and filter element tube (33), helical retainers (35 and 36), and helical spring (37) on filter mount base (35).

14. Push down on top of water trap (32A) and while holding against the spring tension, tilt water trap and filter housing sleeve (31) toward the back of the concentrator and into position beneath inlet filter housing (32).

15. When the ID of water trap (32A) is aligned with the locator on the top of inlet filter housing (32), release water trap and allow spring tension to seat water trap on inlet filter housing.

16. Install filter mount base (34), filter housing sleeve (31), and inlet filter housing (32).

17. Install special bolt (16), helical retainer (29) and support cup (30) as an assembly, from bottom of concentrator assembly.

CAUTION

Nuts are to be lock-wired in such a way that if they were to loosen the lockwire would tighten.

18. Connect lockwire (17) and tie fasteners in accordance with MS33540.

6-90. Inlet Filter Assembly Modification.

Materials Required

Quantity	Description	Reference Number
As Required	Bolt, Special	167715-2
As Required	Lacquer, Black	MIL-L-7178
As Required	Retainer, Helical	1647707-1
As Required	Spring, Helical	1643196-1

NOTE

Index numbers refer to figure 6-13 unless otherwise specified.

1. Remove non-metallic tubing (18) from tube adapter (43).

2. Remove straight tube adapter (43), orifice (44), and screen (45) from filter mount base (34). Discard orifice and screen.

3. If special bolt (16), helical retainer (36), and helical spring (37) need to be modified, proceed to next step. If these parts are already the replacement or modified parts, skip to step 6.

4. Tin plate special bolt (16), helical retainer (36), and helical spring (37) in accordance with MIL-T-10727C, Type I to 0.0002 to 0.0004 inch thick. Accomplishment of this changes them to the -2 configuration of the inlet filter assembly. After tinning, special bolt (16) becomes P/N 1647715-8, helical retainer becomes P/N 1647707-2, and helical spring becomes P/N 1643196-2.

5. Indicate accomplishment of modification by marking inlet filter housing (32) of the inlet filter assembly with P/N 1647710-2 and the GGU-12/A oxygen concentrator by painting the special bolt (16) with black lacquer as shown in figure 6-3.

6. Install straight tube adapter (43) in filter mount base (34). Torque straight tube adapter to 1.5 to 2.5 in-lb.

7. Continue with inlet filter tube element replacement, paragraph 6-89, step 8.

Section 6-5. Illustrated Parts Breakdown

6-91. GENERAL.

6-92. This section lists and illustrates the assemblies and detail parts of the OEAS Oxygen Concentrator, Type GGU-12A, P/N 3261077-0101, manufactured by Litton Systems, Inc., formerly Clifton Precision (CAGE 99251).

6-93. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

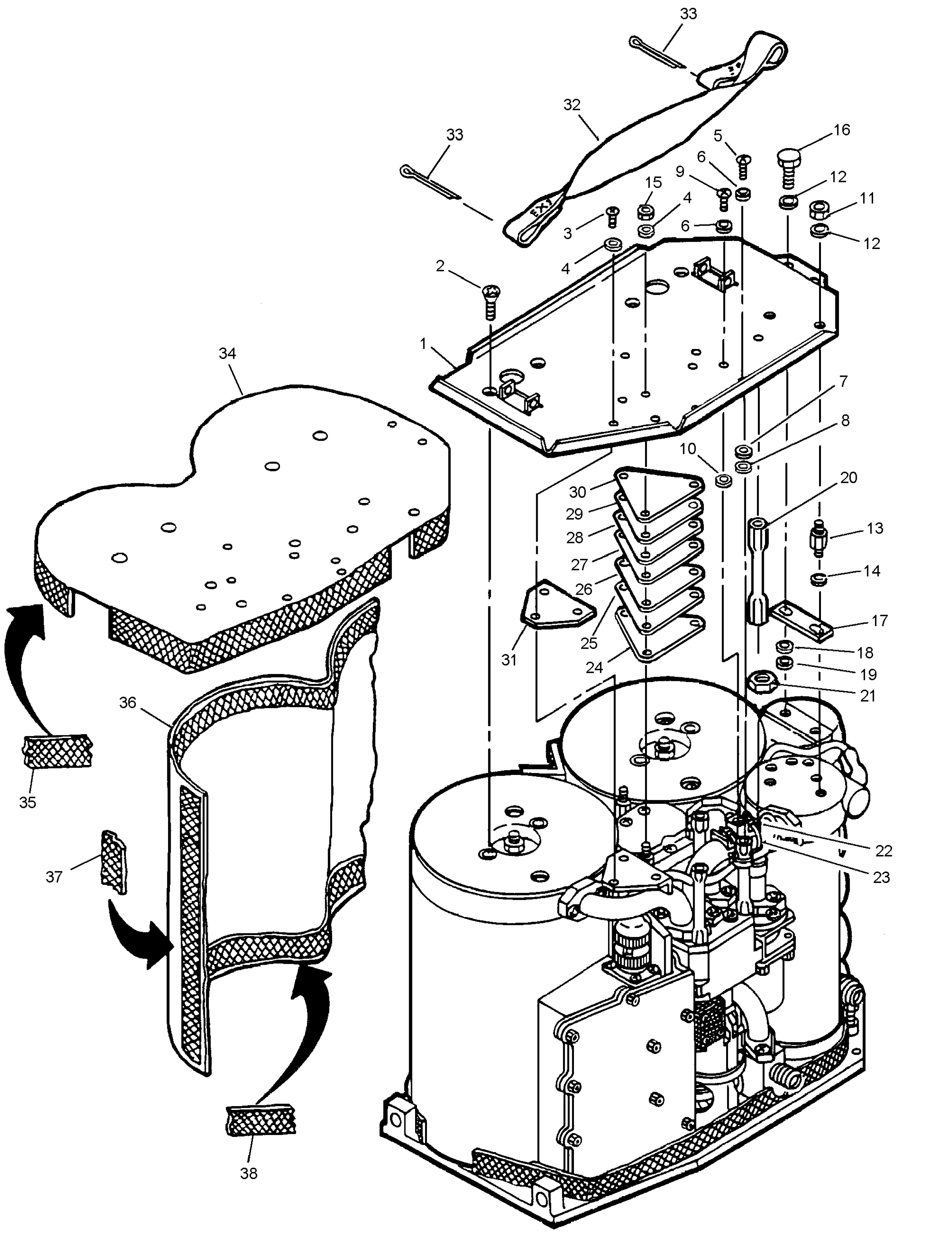

Figure 6-18. Stabilizer Plate/Shroud

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-18	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
-1	1647852-1	. . PLATE, Stabilizer	1	
		(ATTACHING PARTS)		
-2	MS51960-83	. . SCREW, Machine	4	
-3	MS51957-30	. . SCREW, Machine	3	
-4	AN960C6	. . WASHER, Flat	6	
-5	MS51957-63	. . SCREW, Machine	4	
-6	NAS620C10L	. . WASHER, Flat	5	
-7	AN960C10	. . WASHER, Flat	AR	
-8	AN960C10L	. . WASHER, Flat	AR	
-9	MS51957-60	. . SCREW, Machine	1	
-10	NAS620C10L	. . WASHER, Flat	AR	
-11	NAS1423C4	. . NUT, Plain, Hexagon	2	
-12	NAS620C416L	. . WASHER, Flat	4	
-13	1647877-1	. . POST, Electrical-Mechanical	2	
-14	1603660-279	. . WASHER, Flat	AR	
-15	NAS509-06C	. . NUT, Plain, Hexagon	3	
-16	MS51100-5	. . SCREW, Cap, Hexagon	2	
		---*---		
-17	1648573-1	. . SPACER, Heater	AR	
-18	1603661-112	. . WASHER, Flat	2	
-19	AN960C416	. . WASHER, Flat	2	
-20	1647721-2	. . POST, Electrical-Mechanical	1	
-21	MS35649-204	. . NUT, Plain, Hex	1	
-22	1647878-1	. . SUPPORT, Tube, Vent	1	
-23	MS3367-5-9	. . STRAP, Tiedown, Electrical	2	
-24	1650104-1	. . CUSHION, Plenum	1	
-25	1650103-1	. . SHIM, Plenum	AR	
-26	1650103-2	. . SHIM, Plenum	AR	
-27	1650103-3	. . SHIM, Plenum	AR	
-28	1650103-4	. . SHIM, Plenum	AR	
-29	1650103-5	. . SHIM, Plenum	AR	
-30	1650103-6	. . SHIM, Plenum	AR	
-31	1649957-1	. . SPACER	AR	
-32	NAS1212R10 KK14	. . STRAP, Webbing	1	
-33	MS24665-374	. . PIN, Cotter	2	
-34	1647906-1	. . SHROUD, Concentrator	1	
-35	1631267-1	. . . BELT, Loop	AR	
-36	1647907-1	. . SHROUD, Concentrator	1	
-37	1631267-1	. . . BELT, Loop	AR	
-38	1631266-1	. . . BELT, Hook	AR	

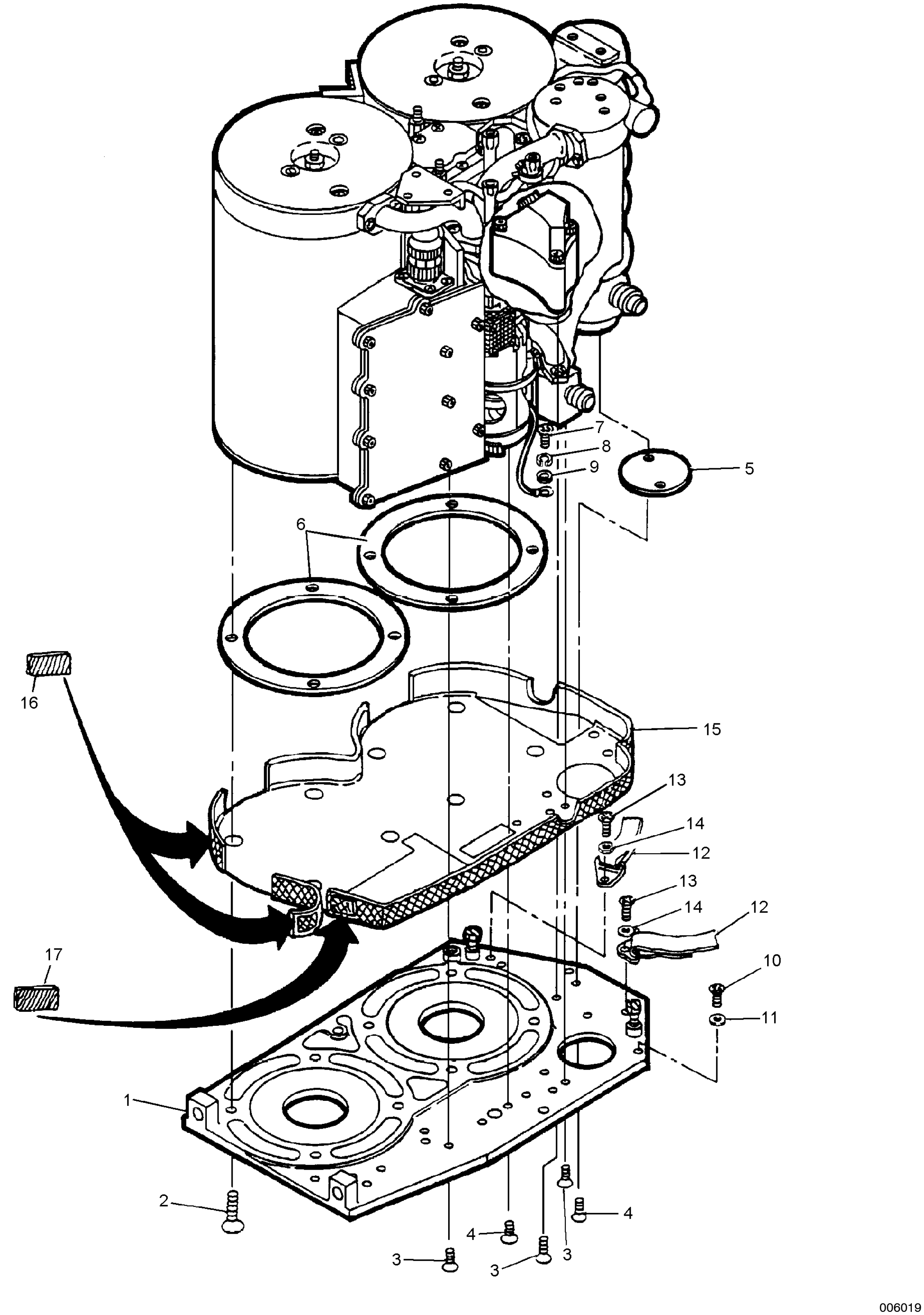

Figure 6-19. Mounting Plate Assembly/Shroud

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-19	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
-1	1647846-1	. . PLATE ASSEMBLY, Mounting	1	
		(ATTACHING PARTS)		
-2	MS51960-100	. . SCREW, Machine	8	
-3	MS51960-66	. . SCREW, Machine	10	
-4	MS51960-84	. . SCREW, Machine	4	
		---*---		
-5	1650100-1	. . SPACER, Ring	2	
-6	1650129-1	. . DISK, Cushion	1	
-7	NAS1351C3-5	. . SCREW, Cap, Socket Hd	1	
-8	MS35338-138	. . WASHER, Lock	1	
	MS35338-157	. . WASHER, Lock (Alternate)	1	
-9	AN960C10L	. . WASHER, Flat	1	
-10	MS35276-259	. . SCREW, Machine	1	
-11	NAS620C10L	. . WASHER, Flat	1	
-12	1648123-1	. . STRAP ASSEMBLY	2	
		(ATTACHING PARTS)		
-13	MS51958-60	. . SCREW, Machine	1	
-14	NAS620C10L	. . WASHER, Flat	1	
		---*---		
-15	1647730-1	. . SHROUD, Concentrator	1	
-16	1631267-1	. . BELT, Loop	AR	
-17	1631266-1	. . BELT, Hook	AR	

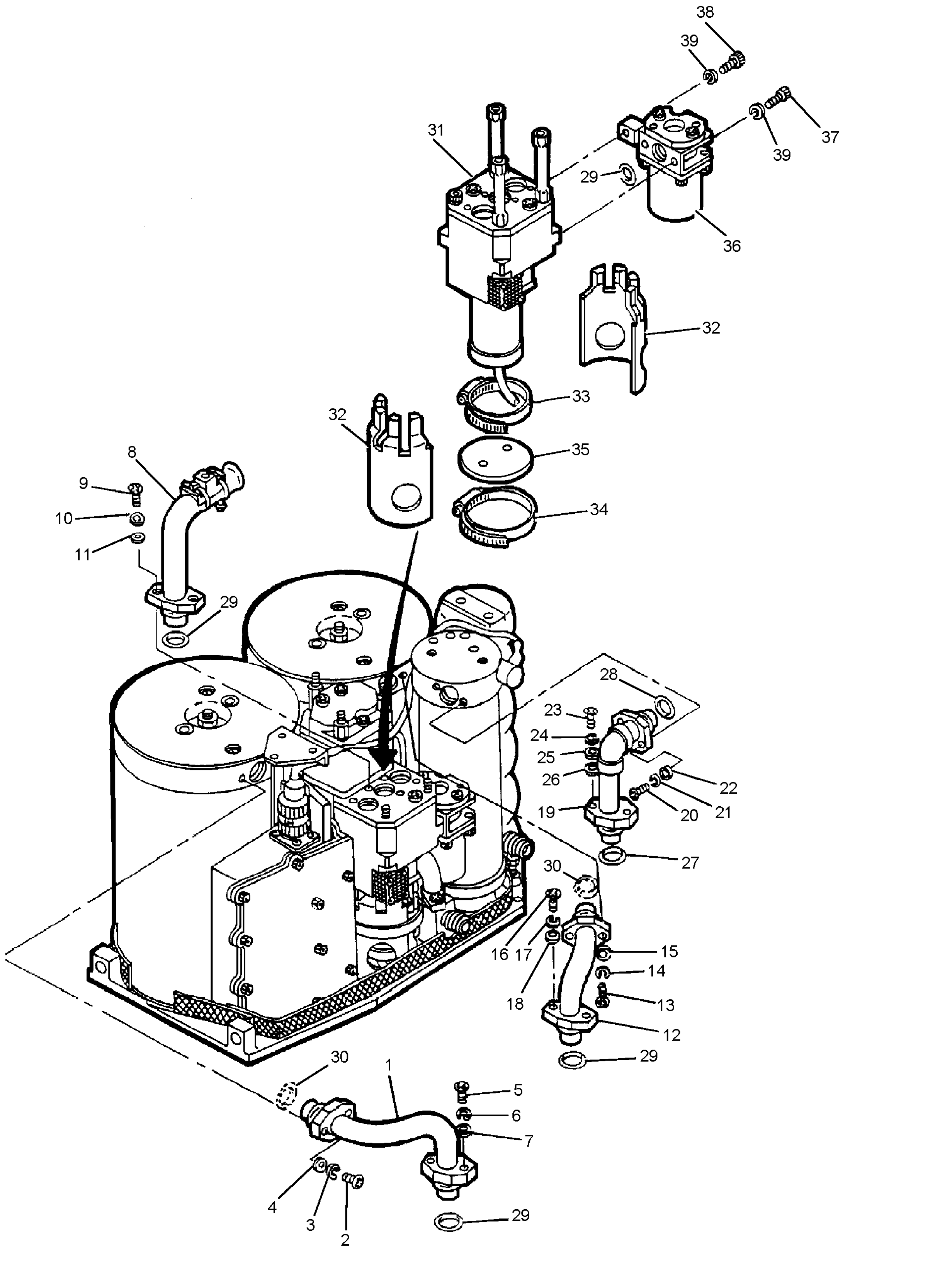

Figure 6-20. Pressure Reducer Assembly/Rotary Valve Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-20	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
-1	1647836-1	. . TUBE ASSEMBLY, Metallic	1	
		(ATTACHING PARTS)		
-2	NAS1352-04-6P	. . SCREW, Cap, Socket Hd	2	
-3	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-4	NAS620C4L	. . WASHER, Flat	2	
-5	NAS1352-04-5P	. . SCREW, Cap, Socket Hd	2	
-6	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-7	NAS620C4L	. . WASHER, Flat	2	
		---*---		
-8	1647838-1	. . TUBE ASSEMBLY, Metallic	1	
	1657867-1	. . TUBE ASSEMBLY, Metallic (Note 1)	1	
		(ATTACHING PARTS)		
-9	NAS1352-04-5P	. . SCREW, Cap, Socket Hd	2	
-10	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-11	NAS620C4L	. . WASHER, Flat	2	
		---*---		
-12	1647848-1	. . TUBE ASSEMBLY, Bent, Metallic	1	
		(ATTACHING PARTS)		
-13	NAS1352-04-6P	. . SCREW, Cap, Socket Hd	2	
-14	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-15	NAS620C4L	. . WASHER, Flat	2	
-16	NAS1352-04-5P	. . SCREW, Cap, Socket Hd	2	
-17	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-18	NAS620C4L	. . WASHER, Flat	2	
		---*---		
-19	1647727-2	. . TUBE ASSEMBLY, Bent, Metallic	1	
		(ATTACHING PARTS)		
-20	NAS1352-04-6P	. . SCREW, Cap, Socket Hd	2	
-21	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-22	NAS620C4L	. . WASHER, Flat	2	
-23	NAS1352-04-6P	. . SCREW, Cap, Socket Hd	2	
-24	MS35338-136	. . WASHER, Lock, Spring	2	
	MS35338-155	. . WASHER, Lock, Spring (Alternate)	2	
-25	NAS620C6	. . WASHER, Flat	2	
-26	NAS620C6L	. . WASHER, Flat	AR	
		---*---		
-27	1602321-5	. . PACKING, Preformed	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-20-28	1602321-5	. . PACKING, Preformed	REF	
-29	MS9068-016	. . PACKING, Preformed	4	
-30	MS9068-016	. . PACKING, Preformed	REF	
-31	1657420-1	. . VALVE ASSEMBLY, Rotary	1	
	1647849-1	. . VALVE ASSEMBLY, Rotary (Note 1)	1	
-32	1649332-1	. . MOUNT, Half, Motor, V	2	
-33	MS35842-12	. . CLAMP, Hose	1	
-34	MS35842-13	. . CLAMP, Hose	1	
-35	1649333-1	. . CLAMP, Loop	1	
-36	1647701-1	. . REDUCER ASSEMBLY, Pressure	1	
-37	NAS1352C3-12	. . SCREW, Cap, Socket Hd	1	
-38	NAS1352C3-8	. . SCREW, Cap, Socket Hd	1	
-39	MS35338-138	. . WASHER, Lock	2	
	MS35338-157	. . WASHER, Lock (Alternate)	2	

Notes: 1. Order rotary valve assembly P/N 1647849-1 until new rotary valve assembly P/N 1657420-1 becomes available in the supply system. Rotary valve assembly P/N 1657420-1 uses tube assembly (8) P/N 1657867-1.

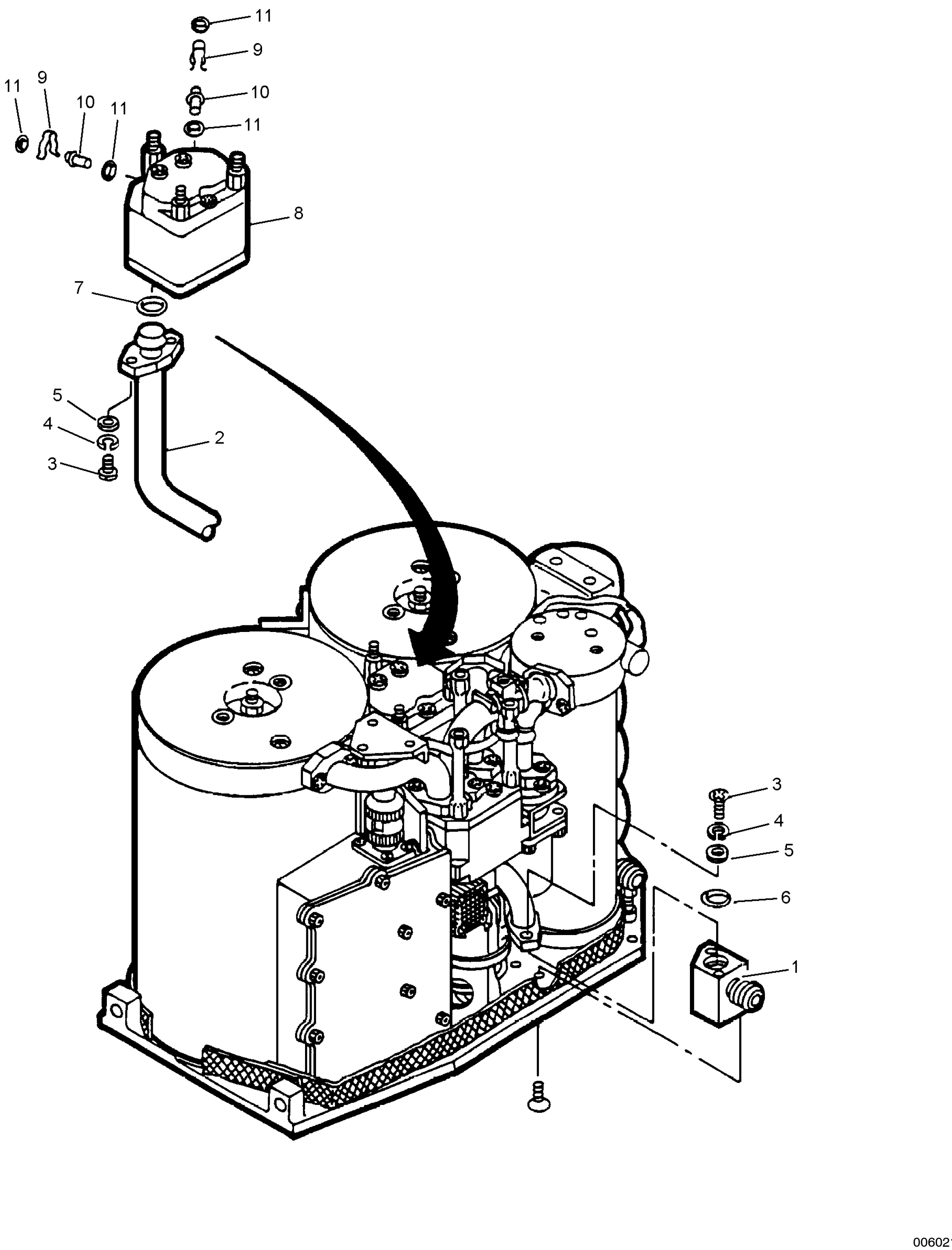

Figure 6-21. Oxygen Fitting/Plenum Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-21	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR . . . . . SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
-1	1647839-1	. . FITTING, Oxygen	1	
-2	1647837-1	. . TUBE ASSEMBLY, Metallic . . . . (ATTACHING PARTS)	1	
-3	NAS1352-04-8P	. . SCREW, Cap, Socket Hd	4	
-4	MS35338-135	. . WASHER, Lock	4	
	MS35338-154	. . WASHER, Lock (Alternate)	4	
-5	NAS620C4L	. . WASHER, Flat . . . . ---*---	4	
-6	1602321-5	. . PACKING, Preformed	1	
-7	1602321-5	. . PACKING, Preformed	REF	
-8	1647725-1	. . PLENUM ASSEMBLY	1	
-9	1630839-1	. . CLIP, Spring Tension	2	
-10	1630838-1	. . BUSHING, Sleeve	2	
-11	1602321-51	. . PACKING, Preformed	REF	

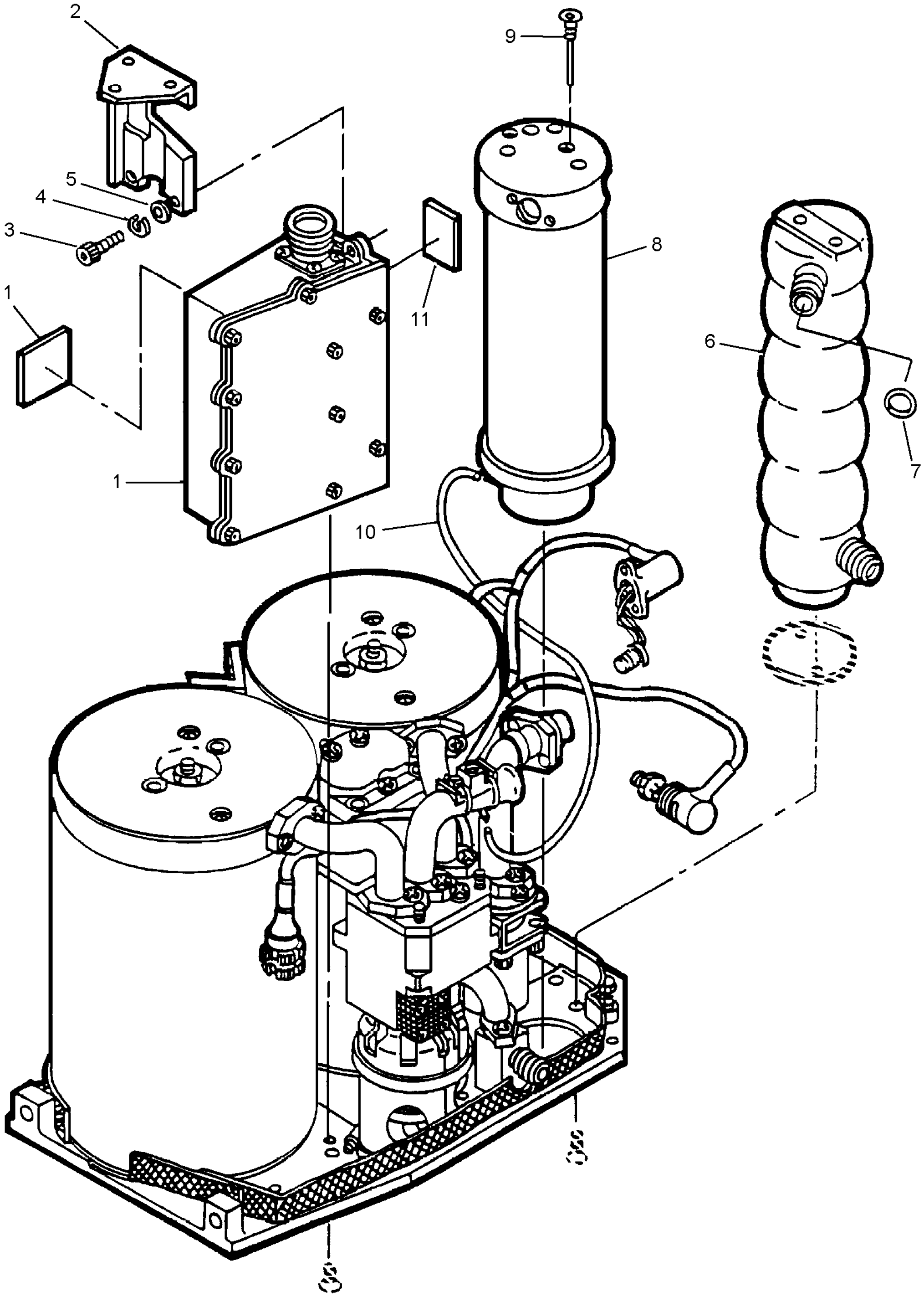

Figure 6-22. Junction Box Assembly/Heater Assembly/Inlet Filter Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-22	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
-1	1647751-1	. . JUNCTION BOX ASSEMBLY	1	
-2	1649318-1	. . BRACKET, Junction Box	1	
		(ATTACHING PARTS)		
-3	NAS1352-06-10P	. . SCREW, Cap Socket Hd	2	
-4	MS35338-136	. . WASHER, Lock, Spring	2	
	MS35338-155	. . WASHER, Lock, Spring (Alternate)	2	
-5	NAS620C6	. . WASHER, Flat	1	
		---*---		
-6	1647850-1	. . HEATER ASSEMBLY	1	
-7	1602321-5	. . PACKING, Preformed	1	
-8	1653997-1	. . FILTER ASSEMBLY, Inlet	1	
-9	1631049-1	. . SETSCREW	4	
-10	TFE1618 (1648106-1)	. . TUBING, Nonmetallic	AR	
	CHEMFLUOR-AXH00002	. . TUBING, Plastic (Note 1)	AR	
-11	1648353-2	. . PAD, Damping	2	

Notes: 1. Vendor: Read Plastics, 12331 Wilkins Ave., Rockville, MD 20582. Tel: (301) 881-7900. Minimum order 50 feet.

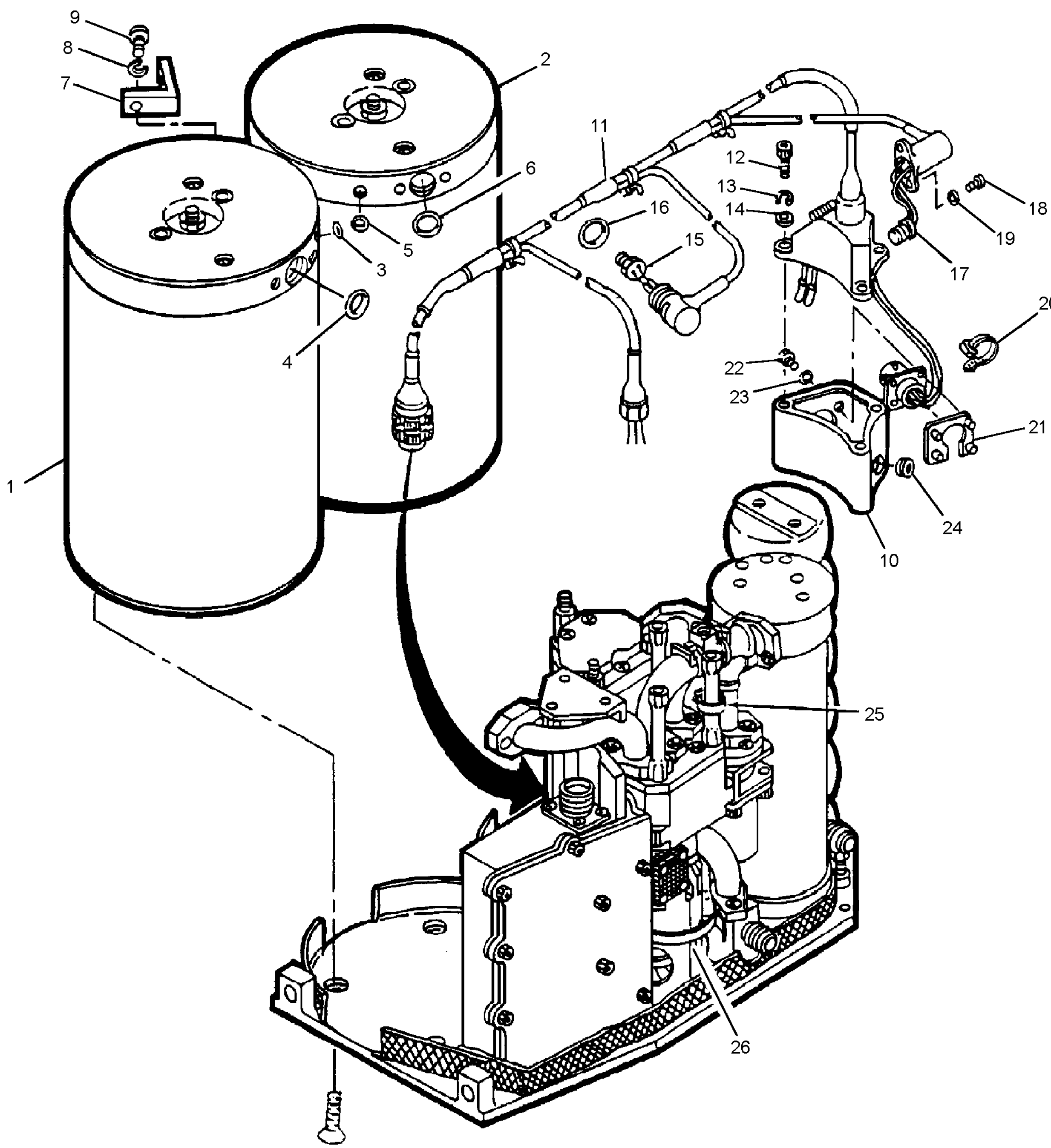

Figure 6-23. Molecular Sieve Bed Assemblies/Special Cable Assembly/Electrical Box

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-23	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
	1601374-1	. . BED ASSEMBLIES, Molecular Sieve (Note 1)	1	
-1	1630850-8	. . . BED ASSEMBLY, Molecular Sieve (Note 1)	1	
-2	1630850-7	. . . BED ASSEMBLY, Molecular Sieve (Note 1)	1	
-3	1602321-51	. . PACKING, Preformed	1	
-4	1602321-5	. . PACKING, Preformed	1	
-5	1602321-51	. . PACKING, Preformed	1	
-6	1602321-5	. . PACKING, Preformed	1	
-7	1631085-1	. . L-BRACKET	1	
		(ATTACHING PARTS)		
-8	MS51958-62	. . SCREW, Machine	2	
-9	MS35338-138	. . WASHER, Lock	2	
	MS35338-157	. . WASHER, Lock (Alternate)	2	
		---*---		
-10	1649306-1	. . BOX, Electrical	1	
-11	1647803-1	. . CABLE ASSEMBLY, Special	1	
		(ATTACHING PARTS)		
-12	NAS1351C3-8	. . SCREW, Cap, Socket Hd	3	
-13	MS35338-138	. . WASHER, Lock	3	
	MS35338-157	. . WASHER, Lock (Alternate)	3	
-14	NAS620C10L	. . WASHER, Flat	3	
		---*---		
-15	A1470	. . RESISTOR, Thermal (1647931-1)	1	
-16	10-00-2085-1285	. . PACKING, Preformed (1649500-23)	1	
-17	M24236/ 24DRNNH	. . SWITCH, Thermostatic	1	
-18	NAS1352C04-4	. . SCREW, Cap, Socket Hd	2	
-19	MS35338-135	. . WASHER, Lock	2	
	MS35338-154	. . WASHER, Lock (Alternate)	2	
-20	MS3367-5-9	. . STRAP, Tiedown, Electrical	1	
-21	1648576-1	. . PLATE, Retaining, Electrical	1	
-22	NAS1352C04-6	. . SCREW, Cap, Socket Hd	4	
-23	NAS620C4L	. . WASHER, Flat	4	
-24	MS35489-147	. . GROMMET, Nonmetallic	1	
-25	MS3367-1-9	. . STRAP, Tiedown, Electrical	1	
-26	MS3367-7-9	. . STRAP, Tiedown, Electrical	1	

Notes: 1. Index number 1, P/N 1630850-8, and index number 2, P/N 1630850-7, can no longer be ordered individually; these parts must now be ordered as a set under P/N 1601374-1, NSN 1680-01-511-0071.

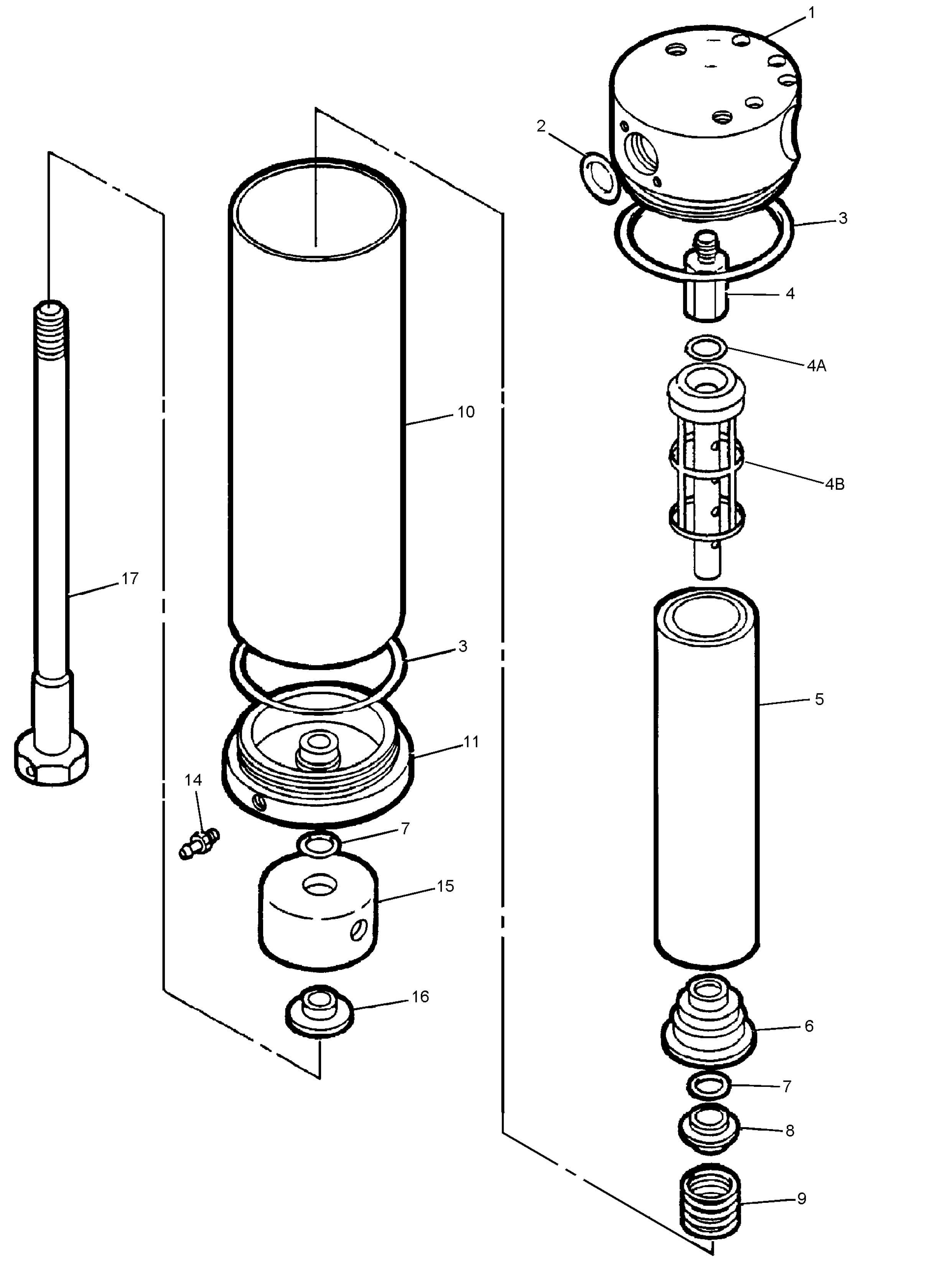

Figure 6-24. Inlet Filter Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-24	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
	1653997-1	. . FILTER ASSEMBLY, Inlet	REF	
-1	1647712-1	. . . HOUSING, Filter, Inlet	1	
-2	1602321-5	. . . PACKING, Preformed	1	
-3	MS9068-035	. . . PACKING, Preformed	2	
-4	1631076-1	. . . ADAPTER, Thread	1	
-4A	1646811-3	. . . SEAL	1	
-4B	1653300-1	. . . TRAP, Water	1	
-5	1643231-1	. . . ELEMENT, Filter Tube	1	
	100-25DX	. . . ELEMENT, Filter Tube	1	
-6	1647709-1	. . . RETAINER, Helical	1	
-7	MS9068-012	. . . PACKING, Preformed	2	
-8	1647707-2	. . . RETAINER, Helical	1	
-9	1643196-2	. . . SPRING, Helical, Comp	1	
-10	1647711-1	. . . SLEEVE, Filter, Hsg	1	
-11	1647717-1	. . . BASE, Filter Mount	1	
-12	DELETED			
-13	DELETED			
-14	1643873-1	. . . TUBE, Fitting	1	
-15	1647723-1	. . . CUP, Support	1	
-16	1647708-2	. . . RETAINER, Helical	1	
-17	1647715-8	. . . BOLT, Special	1	

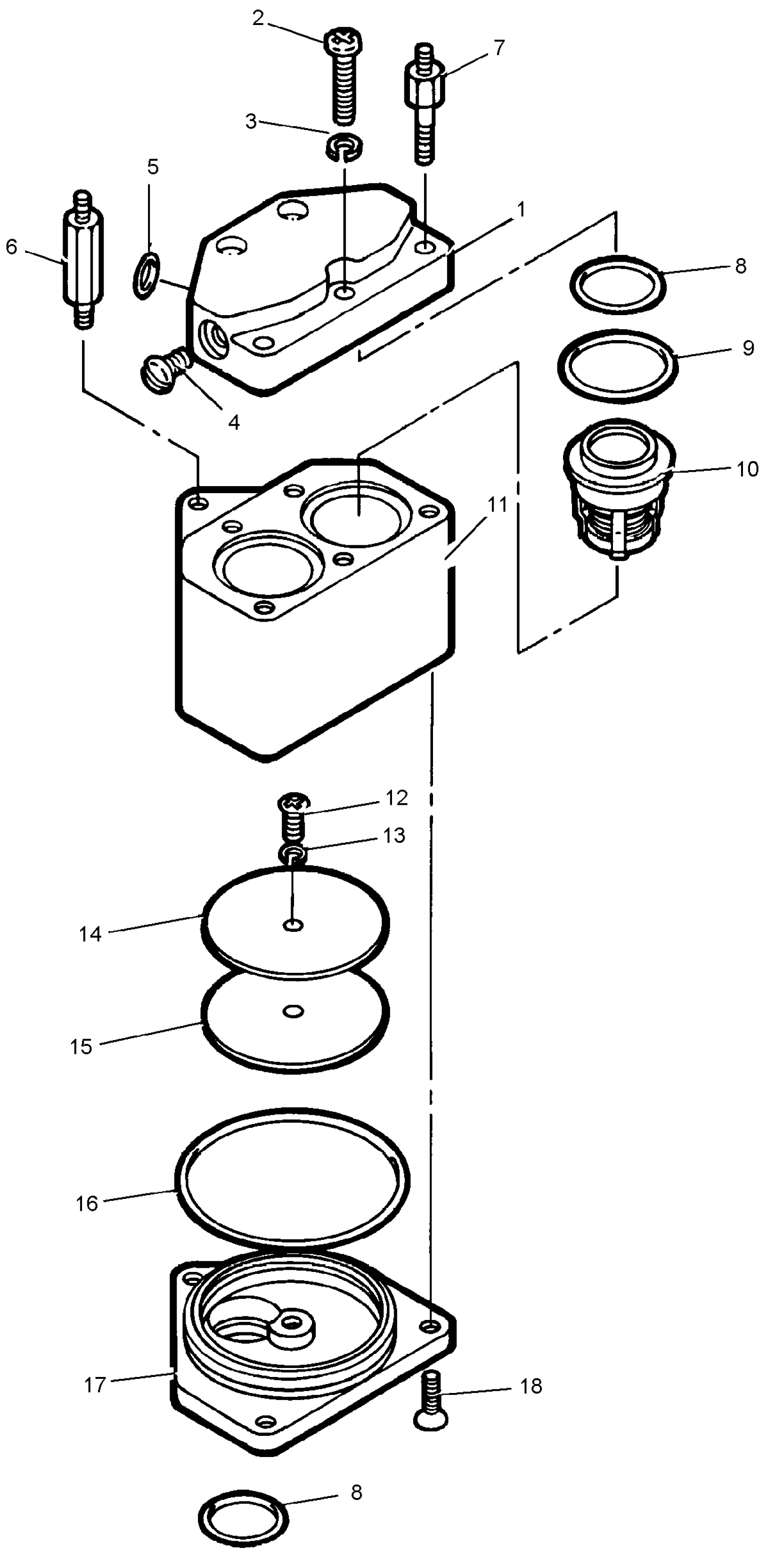

Figure 6-25. Plenum Assembly

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
6-25	3261077-0101	CONCENTRATOR, OXYGEN MOLECULAR ..... SIEVE (GGU-12/A)	REF	
	1647840-1	. CONCENTRATOR ASSEMBLY	REF	
	1647725-1	. . PLENUM ASSEMBLY	REF	
-1	1650173-1	. . . MANIFOLD	1	
		(ATTACHING PARTS)		
-2	MS51957-17	. . . SCREW, Machine	3	
-3	MS35333-70	. . . WASHER, Lock	3	
		---*---		
-4	1618918-9	. . . SCREW, Machine	2	
-5	1602321-51	. . . PACKING, Preformed	2	
-6	1650102-1	. . . POST, Electrical-Mechanical	1	
-7	1647719-1	. . . BOLT, Special	2	
-8	1602321-5	. . . PACKING, Preformed	3	
-9	1602321-73	. . . PACKING, Preformed	2	
-10	1632137-3	. . . VALVE, Check	2	
-11	1647706-1	. . . PLENUM	1	
-12	MS51957-26	. . . SCREW, Machine	1	
-13	MS35333-71	. . . WASHER, Lock	1	
-14	1647716-1	. . . FILTERING DISK, Fluid	1	
-15	1631153-2	. . . FILTER ELEMENT, Fluid	1	
-16	MS9068-030	. . . PACKING, Preformed	1	
-17	1647714-1	. . . COVER, Plenum	1	
		(ATTACHING PARTS)		
-18	MS51959-28	. . . SCREW, Machine	3	
		---*---		

NUMERICAL INDEX

Part Number	Figure and Index No.	SM&R Code
A1470	6-23-15	PAGZZ
AN960C10	6-18-7	PAGZZ
AN960C10L	6-18-8	PAGZZ
	6-19-9	PAGZZ
AN960C416	6-18-19	PAGZZ
AN960C6	6-18-4	PAGZZ
CHEMFLUOR AXH400002	6-22-10	
M24236 /24DRNNH	6-23-17	PAGZZ
MS24665-374	6-18-33	PAGZZ
MS3367-1-9	6-23-25	PAGZZ
MS3367-5-9	6-18-23	PAGZZ
	6-23-20	PAGZZ
MS3367-7-9	6-23-26	PAGZZ
MS35276-259	6-19-10	PAGZZ
MS35333-70	6-25-3	PAGZZ
MS35333-71	6-25-13	PAGZZ
MS35338-135	6-20-3	PAGZZ
	6-20-6	PAGZZ
	6-20-10	PAGZZ
	6-20-14	PAGZZ
	6-20-17	PAGZZ
	6-20-21	PAGZZ
	6-21-4	PAGZZ
	6-23-19	PAGZZ
MS35338-136	6-20-24	PAGZZ
	6-22-4	PAGZZ
MS35338-138	6-19-8	PAGZZ
	6-20-39	PAGZZ
	6-23-9	PAGZZ
	6-23-13	PAGZZ
MS35338-154	6-20-3	PAGZZ
	6-20-6	PAGZZ
	6-20-10	PAGZZ
	6-20-14	PAGZZ
	6-20-17	PAGZZ
	6-20-21	PAGZZ
	6-21-4	PAGZZ
	6-23-19	PAGZZ
MS35338-155	6-20-24	PAGZZ
	6-22-4	PAGZZ
MS35338-157	6-19-8	PAGZZ
	6-20-39	PAGZZ
	6-23-9	PAGZZ
	6-23-13	PAGZZ
MS35489-147	6-23-24	PAGZZ
MS35649-204	6-18-21	PAGZZ
MS35842-12	6-20-33	PAGZZ
MS35842-13	6-20-34	PAGZZ
MS51100-5	6-18-16	PAGZZ
MS51957-17	6-25-2	PAGZZ
MS51957-26	6-25-12	PAGZZ
MS51957-30	6-18-3	PAGZZ
MS51957-60	6-18-9	PAGZZ
MS51957-63	6-18-5	PAGZZ
MS51958-60	6-19-13	PAGZZ
MS51958-62	6-23-8	PAGZZ
MS51959-28	6-25-18	PAGZZ
MS51960-100	6-19-2	PAGZZ
MS51960-66	6-19-3	PAGZZ
MS51960-83	6-18-2	PAGZZ
MS51960-84	6-19-4	PAGZZ
MS9068-012	6-24-7	PAGZZ
MS9068-016	6-20-29	PAGZZ
	6-20-30	PAGZZ
MS9068-030	6-25-16	PAGZZ
MS9068-035	6-24-3	PAGZZ
NAS1212R10 KK14	6-18-32	PAGZZ
NAS1351C3-5	6-19-7	PAGZZ
NAS1351C3-8	6-23-12	PAGZZ
NAS1352-04-5P	6-20-5	PAGZZ
	6-20-9	PAGZZ
	6-20-16	PAGZZ
NAS1352-04-6P	6-20-2	PAGZZ
	6-20-13	PAGZZ
	6-20-20	PAGZZ
	6-20-23	PAGZZ
NAS1352-04-8P	6-21-3	PAGZZ
NAS1352-06-10P	6-22-3	PAGZZ
NAS1352C04-4	6-23-18	PAGZZ
NAS1352C04-6	6-23-22	PAGZZ
NAS1352C3-12	6-20-37	PAGZZ
NAS1352C3-8	6-20-38	PAGZZ
NAS1423C4	6-18-11	PAGZZ
NAS509-06C	6-18-15	PAGZZ
NAS620C10L	6-18-6	PAGZZ
	6-18-10	PAGZZ
	6-19-11	PAGZZ
	6-19-14	PAGZZ
	6-23-14	PAGZZ
NAS620C416L	6-18-12	PAGZZ
NAS620C4L	6-20-4	
	6-20-7	PAGZZ
	6-20-11	PAGZZ
	6-20-15	PAGZZ
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	6-20-22	PAGZZ
	6-21-5	PAGZZ
	6-23-23	PAGZZ

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Part Number	Figure and Index No.	SM&R Code
NAS620C6	6-20-25	PAGZZ
	6-22-5	PAGZZ
NAS620C6L	6-20-26	PAGZZ
TFE1618		
(1648106-1)	6-22-10	PAGZZ
10-00-2085-1285	6-23-16	PAGZZ
100-25DX	6-24-5	PAGZZ
1601374-1	6-23	PAOGD
1602321-5	6-20-27	PAGZZ
	6-20-28	PAGZZ
	6-21-6	PAGZZ
	6-21-7	PAGZZ
	6-22-7	PAGZZ
	6-23-4	PAGZZ
	6-23-6	PAGZZ
	6-24-2	PAGZZ
	6-25-8	PAGZZ
1602321-51	6-21-11	PAGZZ
	6-23-3	PAGZZ
	6-23-5	PAGZZ
	6-25-5	PAGZZ
1602321-73	6-25-9	PAGZZ
1603660-279	6-18-14	PAGZZ
1603661-112	6-18-18	PAGZZ
1618918-9	6-25-4	
1630838-1	6-21-10	PAGZZ
1630839-1	6-21-9	PAGZZ
1630850-7	6-23-2	XAGDD
1630850-8	6-23-1	XAGDD
1631049-1	6-22-9	PAGZZ
1631076-1	6-24-4	XBGZZ
1631085-1	6-23-7	XBGZZ
1631153-2	6-25-15	PAGZZ
1631266-1	6-18-38	XBOZZ
	6-19-17	XBOZZ
1631267-1	6-18-35	XBOZZ
	6-18-37	XBGZZ
	6-19-16	XBGZZ
1632137-3	6-25-10	PAGZZ
1643196-2	6-24-9	PAGZZ
1643231-1	6-24-5	PAGZZ
1643873-1	6-24-14	PAGZZ
1646811-3	6-24-4A	
1647701-1	6-20-36	PAGZZ
1647706-1	6-25-11	XBGZZ
1647707-2	6-24-8	PAGZZ
1647708-2	6-24-16	PAGZZ
1647709-1	6-24-6	PAGZZ
1647711-1	6-24-10	XBGZZ
1647712-1	6-24-1	XBGZZ
1647714-1	6-25-17	XBGZZ
1647715-8	6-24-17	PAGZZ
1647716-1	6-25-14	PAGZZ
1647717-1	6-24-11	XBGZZ
1647719-1	6-25-7	PAGZZ
1647721-2	6-18-20	PAGZZ
1647723-1	6-24-15	XBGZZ
1647725-1	6-21-8	PAGGG
	6-25	
1647727-2	6-20-19	PAGZZ
1647730-1	6-19-15	PAGOG
1647751-1	6-22-1	PAGZZ
1647803-1	6-23-11	PAGZZ
1647836-1	6-20-1	PAGZZ
1647837-1	6-21-2	PAGZZ
1647838-1	6-20-8	PAGZZ
1647839-1	6-21-1	PAGZZ
1647840-1	6-18	
	6-19	
	6-20	
	6-21	
	6-22	
	6-23	
	6-24	
	6-25	
1647846-1	6-19-1	MGGZZ
1647848-1	6-20-12	PAGZZ
1647849-1	6-20-31	PAGDD
1647850-1	6-22-6	PAGZZ
1647852-1	6-18-1	MGGZZ
1647877-1	6-18-13	PAGZZ
1647878-1	6-18-22	MGGZZ
1647906-1	6-18-34	PAGOG
1647907-1	6-18-36	PAGOG
1648123-1	6-19-12	MGGZZ
1648353-2	6-22-11	XBGZZ
1648573-1	6-18-17	MGGZZ
1648576-1	6-23-21	XBGZZ
1649306-1	6-23-10	XBGZZ
1649318-1	6-22-2	MGGZZ
1649332-1	6-20-32	XBGZZ
1649333-1	6-20-35	PAGZZ
1649957-1	6-18-31	MGGZZ
1650100-1	6-19-5	MGGZZ
1650102-1	6-25-6	PAGZZ
1650103-1	6-18-25	MGGZZ
1650103-2	6-18-26	MGGZZ
1650103-3	6-18-27	MGGZZ
1650103-4	6-18-28	MGGZZ
1650103-5	6-18-29	MGGZZ
1650103-6	6-18-30	MGGZZ

NUMERICAL INDEX (Cont)

Part Number	Figure and Index No.	SM&R Code
1650104-1	6-18-24	MGGZZ
1650129-1	6-19-6	PAGZZ
1650173-1	6-25-1	XBGZZ
1653300-1	6-24-4B	PAGZZ
1653997-1	6-22-8	PAGGG
	6-24	
1657420-1	6-20-31	PAGDD
1657867-1	6-20-8	PAGZZ

Part Number	Figure and Index No.	SM&R Code
3261077-0101	6-18	PAOGG
	6-19	PAOGG
	6-20	PAOGG
	6-21	PAOGG
	6-22	PAOGG
	6-23	PAOGG
	6-24	PAOGG
	6-25	PAOGG

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CHAPTER 7

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CHAPTER 9

O_2N_2 CONCENTRATOR

TYPE GGU-xx/A, P/N 3261129-0101 AND 3261129-0102

Section 9-1. Description

9-1. GENERAL.

9-2. The O_2N_2 Concentrator, Type GGU-xx/A, P/Ns 3261129-0101 and 3261129-0102, hereinafter referred to as the concentrator or UUT (figure 9-1), is manufactured by Life Support, a business unit of the Component Technologies sector of Northrop Grumman (CAGE 99251). The concentrator is designed to provide a supply of oxygen-enriched air for crewmember breathing and nitrogen-enriched/oxygen-depleted gas for fuel tank inerting. Table 9-1 contains the leading particulars for the concentrator.

9-3. CONFIGURATION.

9-4. The concentrator consists of shutoff valve V1, filter/water separator FLTR1, and pressure reducer REG1, which are all integral parts of the shutoff valve/filter/regulator assembly; slide valve V2; two oxygen molecular sieve beds, BED 1 O_2 and BED 2 O_2; two nitrogen molecular sieve beds, BED 3 N_2 and BED 4 N_2; plenum assembly (ACC1); and a controller/monitor assembly.

9-5. FUNCTION.

9-6. The concentrator uses compressed/conditioned air supplied by a compressor located in the Environmental Control Unit (ECU) and electrical power from the aircraft to provide oxygen-enriched air for crewmember breathing and nitrogen-enriched/oxygen-depleted air for fuel tank inerting. The compressed air enters the concentrator through shutoff valve (1, figure 9-2). The shutoff valve is controlled by solenoid valve (2) in the controller/monitor assembly. With power applied air flows through the shutoff valve to filter/water separator (3) and pressure reducer (4), which are all integral parts of the shutoff valve/filter/regulator assembly; and then passes through slide valve (5). Solenoid valves (6 and 7), located in the controller/monitor assembly, control slide valve cycling. The supply air is then routed to the two oxygen beds (8 and 9), which operate as an alternating pair so that when one bed is pressurized, adsorbing nitrogen, and producing oxygen-enriched product gas, the other bed is venting to ambient and desorbing nitrogen from the prior pressurization period. The regeneration by desorption of nitrogen in the vented bed is enhanced by a reverse flow of oxygen-enriched gas from the output or product end of the pressurized bed. The amount of the reverse or purge flow through the vented bed is controlled by purge orifice restrictors (10 and 11), located in a flow path connecting the output ends of the two beds. The two oxygen beds are cycled alternately between the pressurization or oxygen-producing mode and the vented, regenerative, nitrogen-purging mode by the slide valve. The output oxygen-enriched product gas from the pressurized beds flows through check valves (12 and 13), filters (14 and 15), to pressure-smoothing plenum (16), and on to the crewmember breathing gas delivery lines.

9-7. In a similar manner, nitrogen beds (17 and 18) operate as a separate, independent, alternating pair so that when one nitrogen bed is pressurized, adsorbing oxygen, and producing nitrogen-enriched inert gas, the other is regenerating by venting to ambient and desorbing oxygen from the prior pressurization period. No reverse purge flow for the vented bed is required. The output of the nitrogen-enriched inert product gas from the pressurized nitrogen beds flows through check valves (19 and 20), flow restrictor orifice (21), and through check valve (22) to the fuel tank inert gas delivery lines.

9-8. Pressure transducers (23 and 24), oxygen sensor (25), and nitrogen sensor (26), located in controller/monitor assembly, provide continuous signals to detect off-limit and failure conditions.

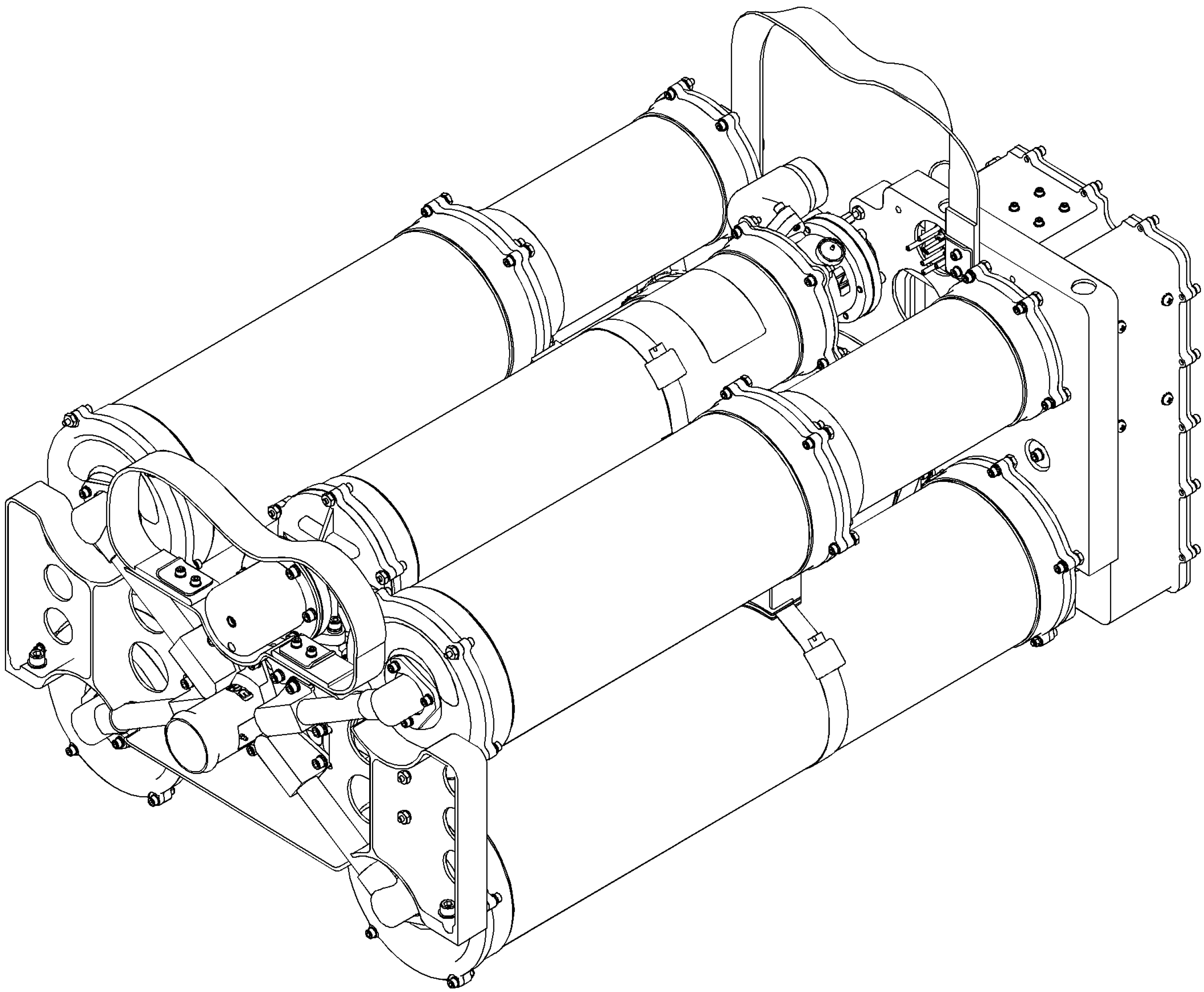

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Figure 9-1. O_2N_2 Concentrator, Type GGU-xx/A, P/N 3261129-0101 and 3261129-0102 (shown with controller/monitor attached)

Table 9-1. Leading Particulars

Type GGU-xx/A	P/N 3261129-0101 and 3261129-0102
Overall Dimensions:	
Length	26 inches
Width	16 inches
Height.	11 inches
Weight	57.1 lbs (max)
Electrical Power	28 V dc (30W max, 18W nominal)
Inlet Air Requirements	Pressure range: 21 to 72 psig (clean, dry, oil free air) Air consumption is approximately 50 cfm at 35 psig
Operating Temperature Range	Ambient temperatures of -65° to +125°F Inlet air temperatures of +40° to +120°F
Exposure Temperature Range	Ambient temperatures of -65° to +160°F
Maximum Operating Altitude	27,000 feet
O_2 Warning Activation	182 mmHg PPO_2
Discrete Fail-Safe O_2 Warning	In addition to the fault reporting via the ARINC interface, a separate, fail-safe warning signal provides a warning under power loss conditions
N_2 Warning Activation	Oxygen concentrations above 8%
Performance Monitoring	Continuous monitoring of both oxygen and nitrogen concentrator outputs for proper concentration and pressure
Built-In-Test (BIT)	Incorporates several BIT modes of operation that preclude the need for O-Level support equipment
Mounting	4 captive fasteners used for aircraft mounting

9-9. ACRONYMS.

9-10. Acronyms used herein are as follows:

Acronym	Definition
CAB	Cabin
CV	Check Valve
ECU	Environmental Control Unit
EXH	Exhaust
I-BIT	Initiated Built In Test
M-BIT	Maintenance Built In Test
ORF	Orifice
PPO_2	Partial Pressure of Oxygen
PSA	Pressure Swing Adsorption
SLPM	Standard Liters Per Minute
SN	Serial Number
T/S	Test Set
TS	Test Set

Section 9-2. Modifications

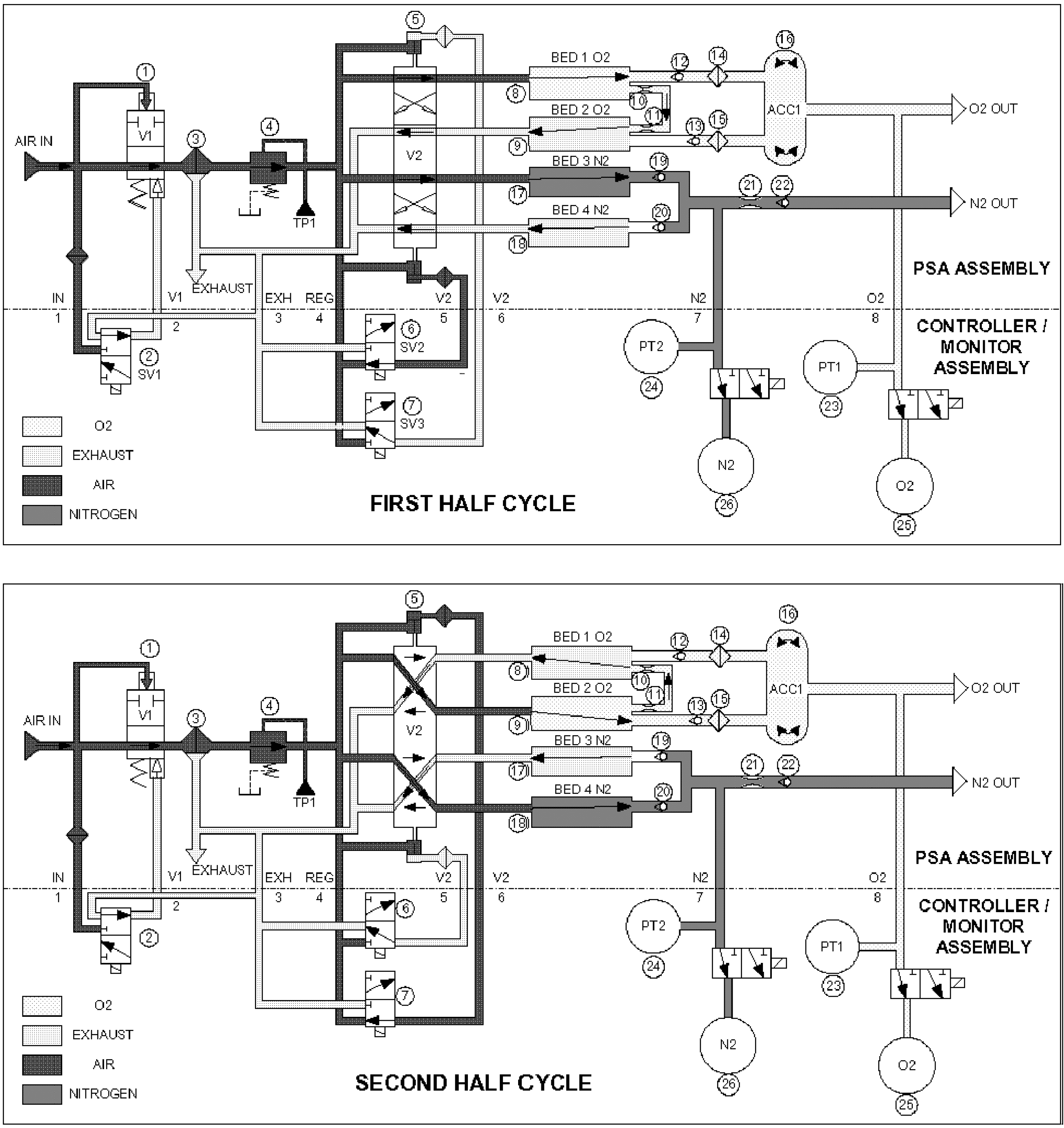
9-11. GENERAL.

9-12. If any concentrator (P/N 3261129-0101) (SN below 11) indicates a failure of the slide valve assembly return concentrator to depot for upgrade to P/N 3261129-0102. This is the only modification to the concentrator required/authorized at this time.

Section 9-3. Performance Test Sheet Preparation

9-13. GENERAL.

9-14. A Performance Test Sheet shall be prepared as shown in figure 9-3 and shall be used to record test results. The Performance Test Sheet shown is a sample, but may be reproduced for local use.



1. SHUTOFF VALVE (V1)
2. SOLENOID VALVE (SV1)
3. FILTER/WATER SEPERATOR (FLTR1)
4. PRESSURE REDUCER (REG1)
5. SLIDE VALVE (SV1)
6. SOLENOID VALVE (SV1)
7. SOLENOID VALVE (SV1)
8. OXYGEN BED (BED 1 O_2)
9. OXYGEN BED (BED 2 O_2)
10. ORIFICE RESTRICTOR (ORF1)
11. ORIFICE RESTRICTOR (ORF2)
12. CHECK VALVE (CV1)
13. CHECK VALVE (CV2)
14. FILTER (FLTR3)
15. FILTER (FLTR4)
16. PRESSURE-SMOOTHING PLENUM (ACC1)
17. NITROGEN BED (BED 3 N_2)
18. NITROGEN BED (BED 4 N_2)
19. CHECK VALVE (CV3)
20. CHECK VALVE (CV4)
21. FLOW RESTRICTOR ORIFICE (ORF3)
22. CHECK VALVE (CV5)
23. PRESSURE TRANSDUCER (PT1)
24. PRESSURE TRANSDUCER (PT2)
25. OXYGEN SENSOR (O_2)
26. OXYGEN SENSOR (N_2)

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Figure 9-2. O_2N_2 Concentrator Pneumatic Schematic

O_2N_2 CONCENTRATOR PERFORMANCE TEST SHEET
P/N 3261129-0101 AND 3261129-0102

DATE__________ CONCENTRATOR SERIAL NO.__________

TEST SET SERIAL NO.__________ TEST SET OPERATOR__________

CDI__________

1. LEAKAGE TEST (MANUAL MODE)
   8. Initial UUT REG PRESS (TP1) Pressure Reading__________
   10. UUT REG PRESS (TP1) Pressure Reading After 5 Minutes__________
   11. Difference__________(8 psi maximum)
   22. Initial UUT REG PRESS (TP1) Pressure Reading__________
   24. UUT REG PRESS (TP1) Pressure Reading After 5 Minutes__________
   25. Difference__________(5 psi maximum)
2. PRESSURE REDUCER TEST (MANUAL MODE)
   5. UUT REG PRESS (TP1) Pressure Reading__________(20 to 30 psig)
   7. UUT REG PRESS (TP1) Pressure Reading__________(16 to 26 psig)
3. OUTLET GAS PRESSURE TEST (MANUAL MODE)

	Ambient Altitude	
	Reading	Tolerance
7. Oxygen Outlet Pressure		greater than 20 psig
8. Oxygen Outlet Oxygen Concentration		25.7% minimum
9. Nitrogen Outlet Oxygen Concentration		7.0% maximum
10. Nitrogen Outlet Flow		65.1 slpm minimum
12. Oxygen Concentration at 30 lpm		83% minimum

4. CONCENTRATOR SHUTDOWN TEST (MANUAL MODE)
   7. S2 OFF, UUT REG PRESS (TP1) less than 2 psig__________(√)
   8. Cycling on UUT REG PRESS (TP1)__________(√)
   9. UUT REG PRESS (TP1) to zero, ARINC Shutdown__________(√)
5. ARINC FUNCTIONAL TEST (MANUAL MODE)

7.	Test Set Indication	ARINC Indication	Difference	Allowed Difference
O_2 Press				± 3.0 psig
O_2 %				± 3.0 %
CAB Press				± 10 mmHg
N_2%				± 1.5 %
PPO_2				± 20 mmHg

   9. Warning light OFF and no ARINC failures__________(√)
   11. I-BIT Complete__________(√)
   13. M-BIT Complete__________(√)
   15. Low O2 output pressure__________(√)

Figure 9-3. Performance Test Sheet

Section 9-4. Maintenance

9-15. GENERAL.

9-16. This section contains the procedural steps for inspection and testing of the concentrator.

9-17. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and in the sequence in which they normally occur.

NOTE

Upon completion of any maintenance action (inspection or testing), be sure to complete the required maintenance data collection systems forms and required entries on Scheduled Removal Component Card OPNAV Form 4790/28.

9-18. INSPECTIONS.

9-19. Concentrators that do not pass inspection and cannot be adjusted in the aircraft shall be removed and replaced with a Ready-For-Installation (RFI) concentrator. The replaced concentrator shall be forwarded to AIMD/MALS for Bench Test and Repair.

9-20. TURNAROUND/PREFLIGHT/POST FLIGHT/TRANSFER INSPECTIONS. The Turnaround/Preflight/Postflight/Transfer Inspections are performed in conjunction with the aircraft inspection requirements for the aircraft in which the concentrator is installed.

9-21. ACCEPTANCE/SPECIAL/DAILY INSPECTIONS. The Acceptance/Special/Daily Inspections shall be performed in conjunction with the aircraft inspection requirements for the aircraft in which the concentrator is installed using applicable aircraft technical publications and maintenance requirement cards.

9-22. CALENDAR/PHASED/SDLM INSPECTIONS. The Calendar/Phased/SDLM Inspections require removal of the concentrator from the aircraft. See applicable Planned Maintenance System (PMS) publications for specified intervals. In no case shall the interval exceed 500 flight hours. Upon removal from the aircraft, the concentrator shall be forwarded to AIMD/MALS for Inspection and Testing.

9-23. VISUAL INSPECTION. To perform a Visual Inspection of the concentrator, proceed as follows:

1. Inspect the concentrator for dents, corrosion, dirt, contamination, and other obvious damage. Correct as necessary.

2. Inspect all welded points for security of attachment and breaks in welding. Correct as necessary.

3. Inspect all external screws, nuts, and fittings for good condition. Correct as necessary.

4. Inspect nameplate for legibility, security of attachment, and good condition. Correct as necessary.

9-24. BENCH TEST.

WARNING

When working with oxygen, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Fire or explosion may result when even slight traces of combustible material come in contact with oxygen under pressure.

NOTE

When performing Bench Test in the manual mode, use the Performance Test Sheet (figure 9-3) for recording readings and indications as they apply. During the automated mode tests, data is saved to the hard drive in the test set computer and can be printed. Read the entire step before beginning to familiarize yourself with what needs to be recorded for that step.

Concentrators failing the Bench Test shall be repaired. The aviation life support systems division shall replace all defective component parts and make necessary adjustments to the concentrator.

9-25. Bench Test shall be performed on the concentrator prior to being placed in service and every 500 flight hours when inlet filter element is replaced. The inlet filter element shall be replaced every time the concentrator is serviced prior to any testing or repair. The concentrator shall also be subjected to Bench Test if malfunction is suspected, and after repair or replacement of malfunctioning or damaged parts.

9-26. The Bench Test shall be performed using the O_2N_2 Concentrator Test Set, P/N 3300204-6101 only.

Refer to figure 9-4 for concentrator interfaces and identification of test set controls, indicators, and accessories referred to in the Bench Test.

9-27. Due to the complexity of the test set, it is essential the operator become thoroughly familiar with test set prior to performing the Bench Test. Refer to appropriate ground support equipment manual.

9-28. Unless otherwise specified in the specific test, the pressure applied and valve positioning shall remain unchanged.

NOTE

Paragraph 9-29 covers the test setup of the concentrator using the concentrator controller/monitor. In case of a malfunction of the concentrator, and in order to prevent unnecessary replacement of concentrator controller/monitor, procedures are given in paragraph 9-37 to cover the testing of the concentrator using the test set controller/monitor.

9-29. TEST SET SETUP USING CONCENTRATOR CONTROLLER/MONITOR ONLY.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry Compound	—

Support Equipment Required

Quantity	Description	Reference Number
1	O_2N_2 Concentrator Test Set	3300204-6101 (CAGE 99251)
1	Exhaust Silencer Assembly (Muffler, Exhaust)	901-225-017-101 (CAGE 77272)
1	Surge Suppressor	—

1. Ensure both test set lids are removed.

2. Ensure test set circuit breaker 115 VAC ON/OFF (CB1), switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) are in OFF position.

3. Remove all hoses, cables, and adapters from lid of the test set. Remove muffler and computer from test set front panel.

4. Remove protective caps, dust cap, and shipping plugs from the concentrator.

WARNING

Hazardous voltages may be present on case of test set if power plug and source are not connected to safety ground.

NOTE

Refer to figure 9-4 for concentrator interfaces and identification of test set controls, indicators, and accessories.

Unless otherwise noted, refer to figure 9-5 for test setup.

5. Connect the one end of test set power cable (P/N 3309146-1) to test set 115 VAC (J1) and other end to the surge suppressor.

6. Connect the one end of test set computer (P/N 3309268-1) power supply to the computer (P/N 3309268-1) and other end to the surge suppressor and connect the surge suppressor to a 115 V, 60 Hz power source.

7. Connect one end of test set cable assembly (P/N 3309386-1) to the test set computer (P/N 3309268-1) and the other end to test set TO COMPUTER (J3).

8. Connect test set cable assembly (P/N 3309142-1) to test set TO UUT MONITOR (J2). Connect other end of test set cable assembly (P/N 3309142-1) to (J1 and J2) on concentrator controller/monitor.

9. Connect connector assembly (P/N 3308193-1) to concentrator N_2 outlet port. Connect the hose assembly (P/N 3309243-1) from connector assembly (P/N 3308193-1) on the N_2 outlet port to the test set plenum (J13).

10. Connect the hose assembly (P/N 3309243-1) from the test set plenum (J15) to the test set panel N_2 FROM PLENUM port (J8).

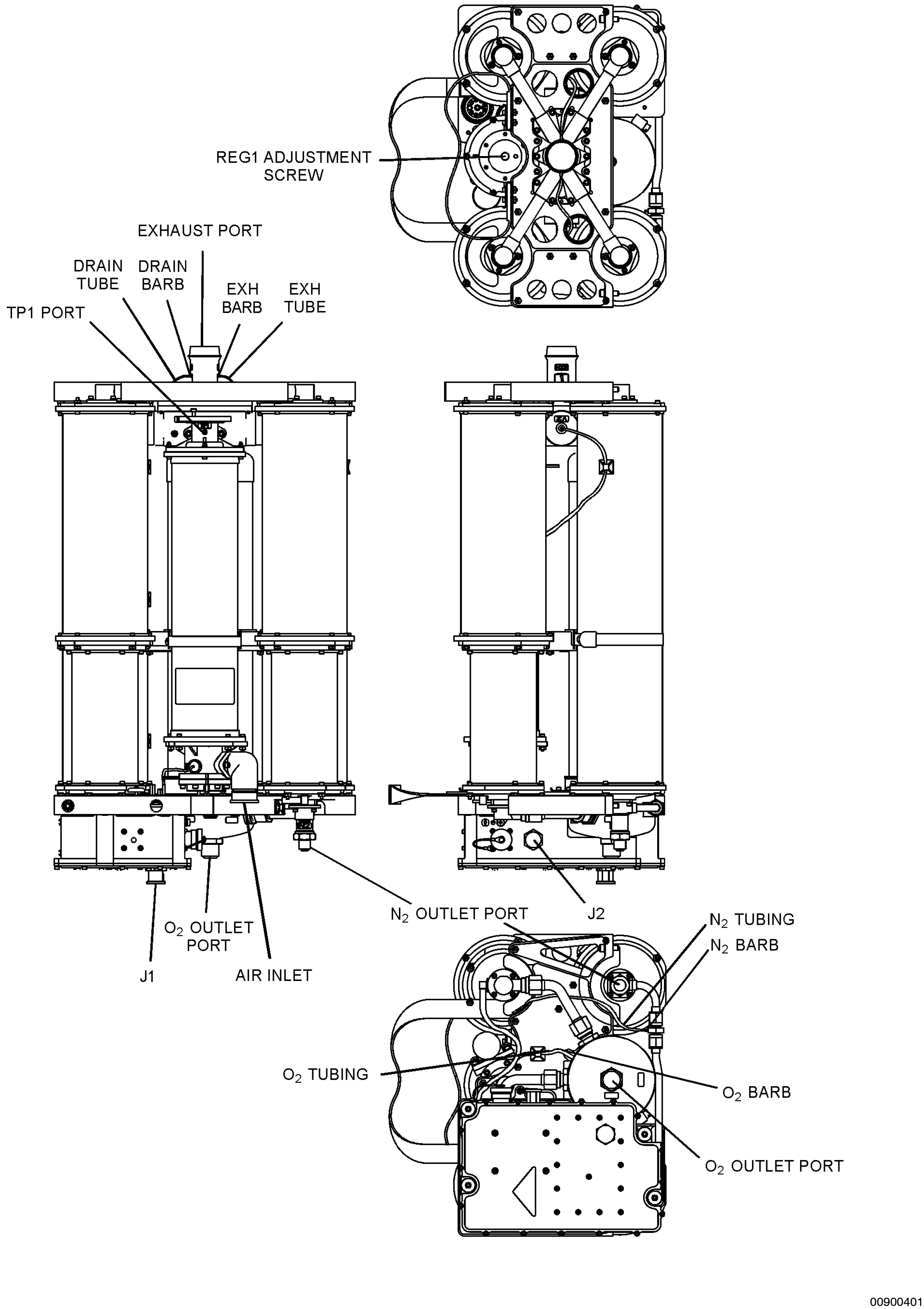


Figure 9-4. Interfaces (O_2N_2 Concentrator) (Sheet 1 of 4)

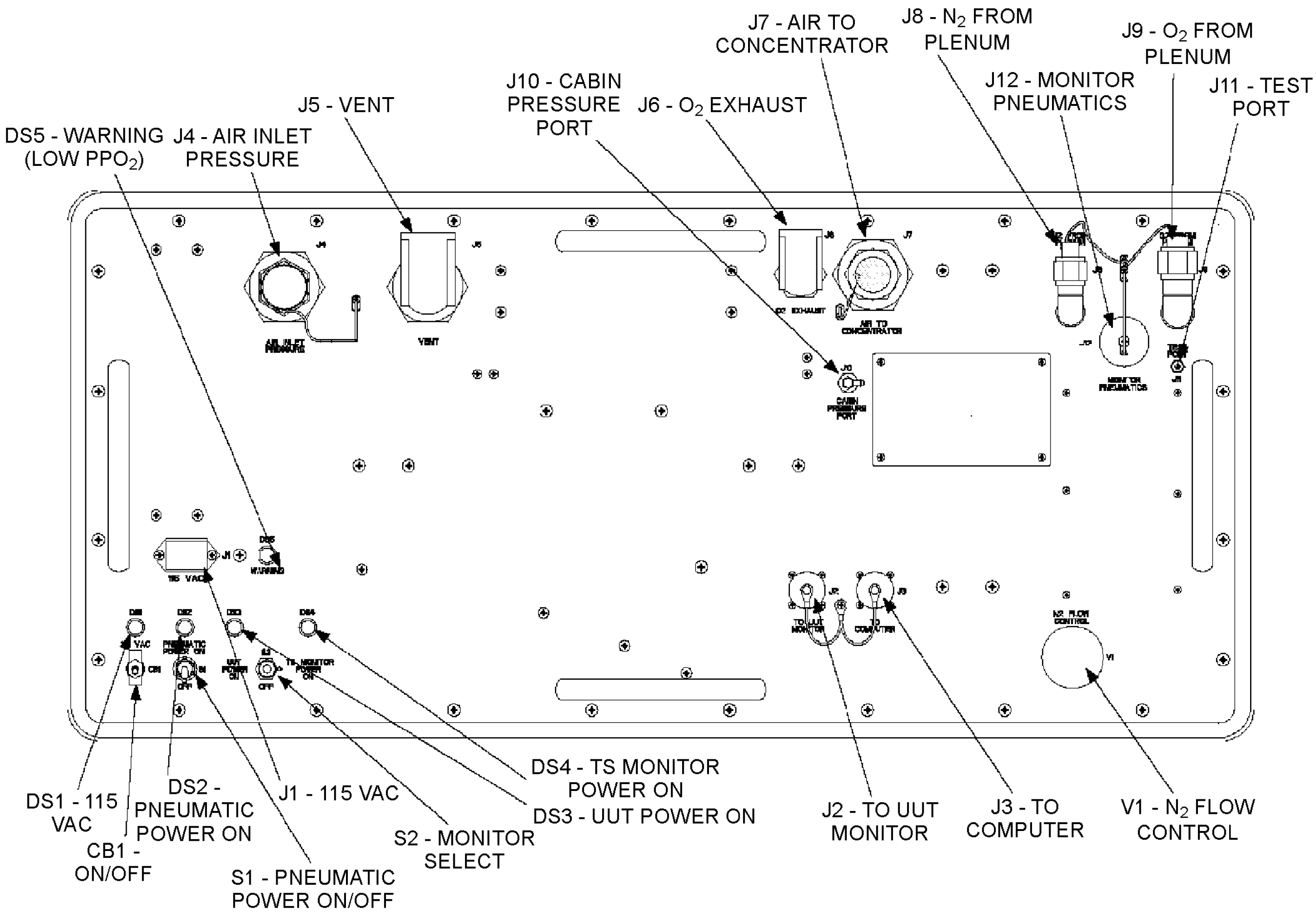


Figure 9-4. Interfaces (Front Panel of Test Set Box 1 of 2) (Sheet 2 of 4)

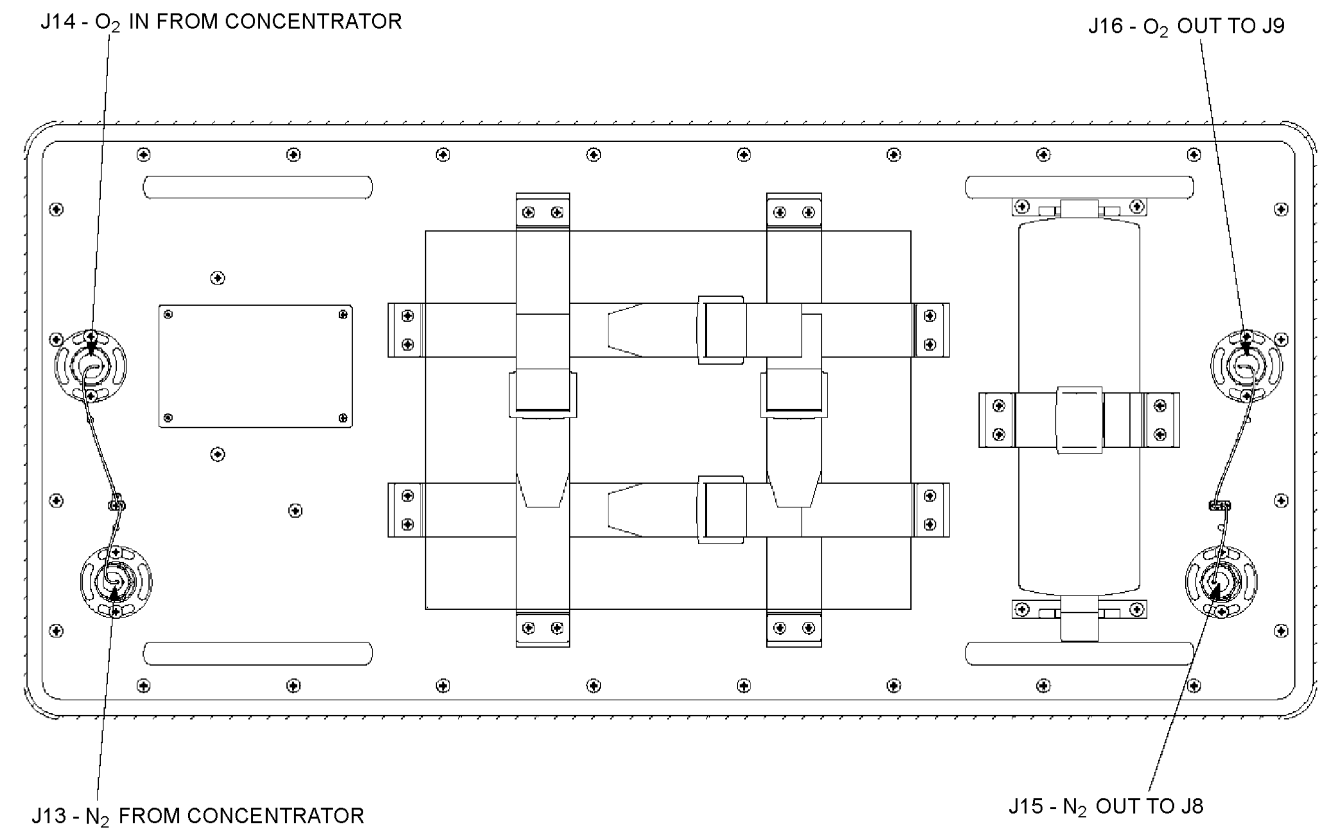


Figure 9-4. Interfaces (Front Panel of Test Set Box 2 of 2) (Sheet 3 of 4)

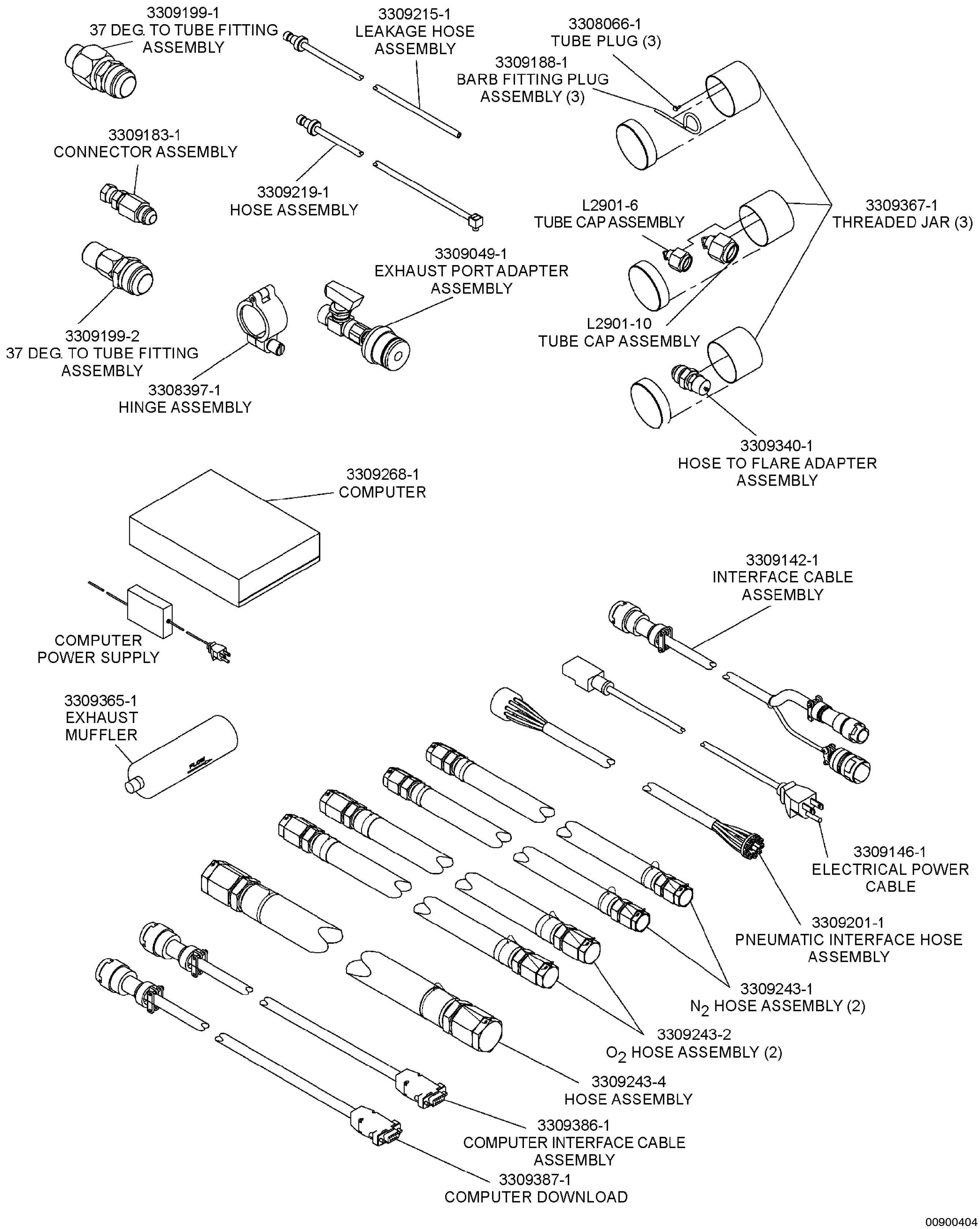


Figure 9-4. Interfaces (Test Set Accessories) (Sheet 4 of 4)

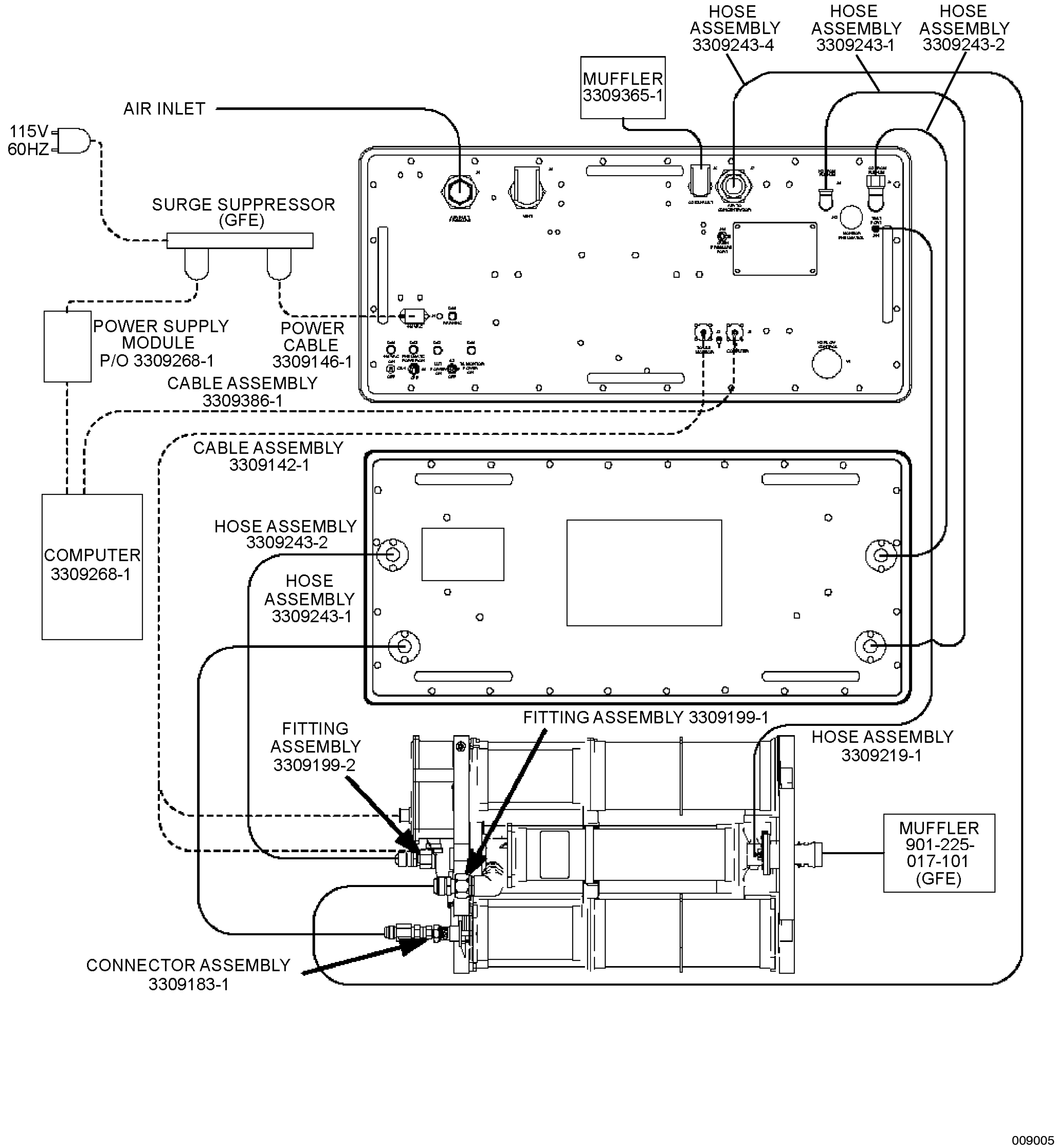


Figure 9-5. O_2N_2 Concentrator Performance Test Setup Using Concentrator Controller/Monitor Only (Normal)

11. Connect fitting assembly (P/N 3309199-2) to the O_2 outlet port. Connect the hose assembly (P/N 3309243-2) from fitting assembly (P/N 3309199-2) connected to the O_2 outlet port on the concentrator to the test set plenum (J14).

12. Connect the hose assembly (P/N 3309243-2) from the test set plenum (J16) to the test set panel O_2 FROM PLENUM port (J9).

13. Connect fitting assembly (P/N 3309199-1) to air inlet port. Connect the hose assembly (P/N 3309243-4) from the test set front panel AIR TO CONCENTRATOR port (J7) to fitting assembly (P/N 3309199-1) connected to air inlet port on the concentrator.

14. Connect the air source to the test set AIR INLET PRESSURE port (J4). Turn on the compressor.

15. Remove the test port plug from the concentrator pressure reducer at TP1 port and connect the test set hose assembly (P/N 3309219-1) between the concentrator TP1 port and test set TEST PORT (J11).

16. Connect the muffler (P/N 3309365-1) to the test set O_2 EXHAUST port (J6).

17. Connect the GFE supplied muffler (P/N 901-225-017-101) to the exhaust on the concentrator.

18. Place the computer (P/N 3309268-1) switch to the ON position.

19. Place the test set 115 VAC ON/OFF circuit breaker (CB1) to ON.

20. When Windows starts, select the V22 TS icon to start the program.

NOTE

Refer to figure 9-6 for reference O_2N_2 concentrator test set display.

The test set requires a 15-minute warmup period (after 115 VAC ON/OFF (CB1) is turned on) to achieve the specified accuracy. Wait for the T/S Ready light to turn green prior to performing any concentrator acceptance testing.

21. Wait until the TEST SET Warmup counts down to zero, and the T/S Ready light is green.

22. The default screen will appear. Enter the concentrator Serial Number.

23. Refer to the appropriate test for further instructions.

CAUTION

To extend the life of the electronic regulators used in this test set, switch PNEUMATIC POWER ON/OFF (S1) should be in OFF position when concentrator testing or troubleshooting is not in progress.

24. When concentrator testing or troubleshooting is not in progress, turn switch PNEUMATIC POWER ON/OFF (S1) to the OFF position.

25. The data files for each test are stored automatically on the computer hard drive in the folder C:\V22_TS\SN\Individual_Test or C:\V22_TS\SN\Acceptance_Test. The file name is then SN.TEST Letter Run#. The file name is the concentrator serial number followed by a file extension that identifies the specific test and the number of times that this has been performed (SN.TEST Letter Run#).

26. For example: C:\V22-TS\001\Individual_Test\001.a03 would indicate the third time the leakage test has been performed on serial number 001.

27. After all concentrator testing is complete, use the Windows file manager to copy all files associated with that particular serial number to a 3-1/2-inch floppy disk. This disk, along with the completed data sheet, will form a permanent record for each concentrator.

NOTE

Paragraph 9-37 covers the testing of the concentrator using the test set controller/monitor in lieu of the concentrator controller/monitor. Using the test set controller/monitor may be used to assist with troubleshooting and in order to prevent unnecessary replacement of concentrator controller/monitor.

After concentrator has been repaired and all maintenance actions have been completed the following automated performance test shall be performed.

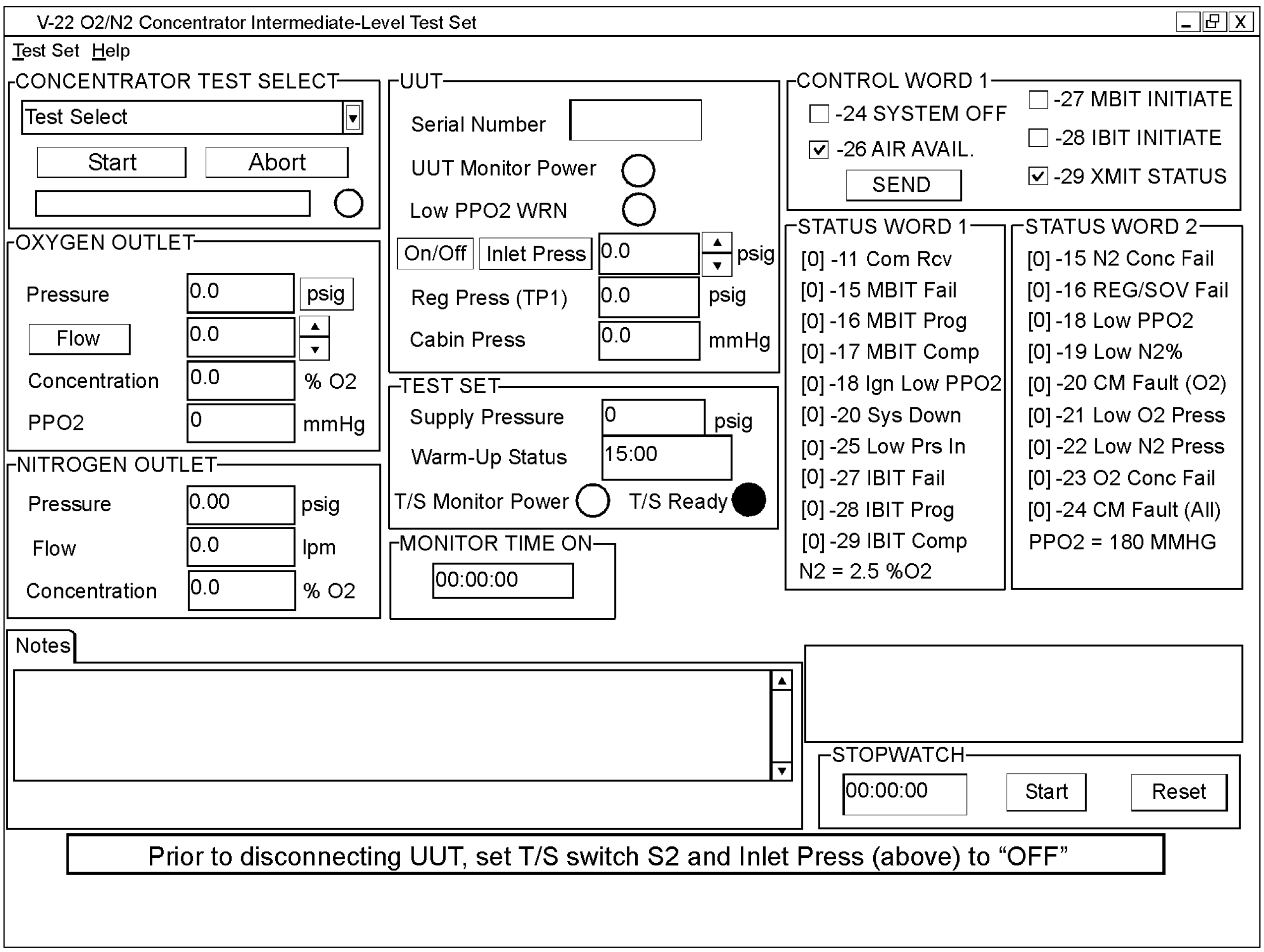


Figure 9-6. O_2N_2 Concentrator Test Set Display

9-30. AUTOMATED PERFORMANCE TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY. To perform the automated performance test (****Run All Tests****), proceed as follows:

NOTE

****Run All Tests**** test runs the leakage, pressure reducer, outlet gas performance, concentrator shutdown, and ARINC functional test in sequence. Data from the tests is saved to C:\V22_TS\SN\Acceptance_Test. For a description of each test refer to the appropriate section below.

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Click CONCENTRATOR TEST SELECT menu.

3. Using the mouse, click **** Run All Tests **** and click START. This will activate the test set to perform the testing sequence. During this test, manual instructions will appear on the monitor screen. Follow these instructions as they appear. At the completion of this test, the monitor screen will indicate passed or failed. If a failed indication is displayed, click appropriate tab (example: (A) Leakage Test) to the right of the Notes tab. The Notes text will display information as to the failure(s) that occurred. If failure occurs, refer to appropriate troubleshooting table.

4. Following the completion of testing, replace all shipping caps and dust covers on the concentrator and test set.

9-31. AUTOMATED INDIVIDUAL TESTS USING CONCENTRATOR CONTROLLER/MONITOR ONLY. Each test may be run individually in the automated mode. To perform an individual automated test, proceed as follows:

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Click CONCENTRATOR TEST SELECT menu.

3. Using the mouse, click the appropriate individual test (example: (A) Leakage Test) and click START. This will activate the test set to perform the testing sequence. During this test, manual instructions will appear on the monitor screen. Follow these instructions as they appear. At the completion of this test, the monitor screen will indicate passed or failed. If a failed indication is displayed, click appropriate tab (example: (A) Leakage Test) to the right of the Notes tab. The Notes text will display information as to the failure(s) that occurred. Refer to figures 9-4 and 9-7 during testing for correct leakage test setup. If failure occurs, refer to appropriate troubleshooting table.

NOTE

Paragraphs 9-32 through 9-36 contain procedural steps for testing of the concentrator manually for each individual test. The following tests are identical to the automated tests described above but will allow operator interaction.

9-32. LEAKAGE TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY. To perform the leakage test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-7 during testing for correct leakage test setup.

1. Ensure the test setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Remove the GFE supplied muffler (P/N 901-225-017-101) from the concentrator and plug the concentrator exhaust port using the adapter assembly (P/N 3309049-1) and the hinge assembly (P/N 3308397-1). Place the valve on adapter assembly (P/N 3309049-1) to the CLOSED position.

3. Disconnect the concentrator O_2 tubing from the O_2 barb at the concentrator plenum and disconnect the concentrator N_2 tubing from the N_2 barb. Plug the N_2 and O_2 tubing with the plugs (P/N 3308066-1) and plug the O_2 and N_2 barbs with plug assembly (P/N 3309188-1).

4. Disconnect hose assembly (P/N 3309243-1) with connector assembly (P/N 3309183-1) attached from concentrator N_2 Outlet port. Disconnect hose assembly (P/N 3309243-2) from fitting assembly (P/N 3309199-2). Cap the N_2 Outlet port on the concentrator with the cap (P/N L2901-6) and cap the O_2 Outlet port on the concentrator with the fitting assembly (P/N 3309199-2) and cap (P/N L2901-10).

5. Remove the concentrator EXH tubing from the concentrator EXH barb and plug the concentrator EXH tube barb with the plug assembly (P/N 3309188-1).

6. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

7. Adjust the UUT Inlet Press to obtain a pressure of 35 ±1 psig. Click Reset button of the STOPWATCH and pressurize the concentrator for 3 minutes. After 3 minutes, plug the tubing labeled EXH with a tube plug (P/N 3308066-1).

8. Record initial UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

9. Click UUT On/Off to off and click Reset button of the STOPWATCH.

10. After 5 minutes, record UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

11. Record difference between steps 8 and 10 on Performance Test Sheet. The difference between the two readings shall not exceed 8 psi.

12. Slowly move the valve on the adapter assembly to the OPEN position.

13. Remove the test set plugs (P/N 3308066-1) and plug assemblies (P/N 3309188-1) from the concentrator O_2 and N_2 barbs and tubing.

14. Remove the test set plug (P/N 3308066-1) and plug assembly (P/N 3309188-1) from the EXH port and tubing. Reconnect the EXH tubing to the EXH barb on the concentrator exhaust tube.

15. Remove the hinge assembly (P/N 3308397-1) and the adapter assembly (P/N 3309049-1). Reconnect the GFE supplied muffler (901-225-017-101) to the concentrator exhaust port.

16. Remove the caps (P/N L2901-10 and P/N L2901-6) and from the concentrator O_2 and N_2 outlet ports. Reconnect the tubing to the O_2 and N_2 barbs.

17. Reconnect connector assembly (P/N 3309183-1) with hose (P/N 3309243-1) attached to concentrator N_2 outlet port. Disconnect end of hose assembly (P/N 3309243-1) connected to plenum port (J13) and connect adapter assembly (P/N 3309340-1) to test set hose assembly.

18. Connect leakage hose assembly (P/N 3309215-1) to adapter assembly. Disconnect hose from test set TEST PORT (J11) and connect leakage hose assembly to test set TEST PORT (J11).

19. Adjust the UUT Inlet Press to obtain a pressure of 27 ±1 psig.

20. From the Test Set menu, set J11 Test Pressure On. Click Start button of the STOPWATCH.

21. After two minutes, set J11 Test Pressure off. Set UUT Inlet Press to 0.0 psig.

22. Record initial UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

23. Click Reset button of the STOPWATCH.

24. After 5 minutes, record UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

25. Record difference between steps 22 and 24 on Performance Test Sheet. The difference between the two readings shall be less than 5 psi.

26. Disconnect leakage hose assembly from test set TEST PORT (J11) and adapter assembly. Reconnect hose from concentrator TP1 to test set TEST PORT (J11). Remove adapter assembly.

27. Reconnect the test set hoses between plenum assembly and concentrator O_2 and N_2 outlet ports.

28. If malfunction occurs, refer to troubleshooting (table 9-2).

29. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-33. PRESSURE REDUCER TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY. To perform the pressure reducer test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-5 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

3. Set the OXYGEN OUTLET Flow to obtain 230 ±2 lpm.

4. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

5. Record UUT Reg Press (TP1) pressure reading on Performance Test Sheet. The pressure swing shall be 20 to 30 psig.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

6. Adjust the UUT Inlet Press to obtain a pressure of 25 +0,-1 psig.

7. Record UUT Reg Press (TP1) pressure reading on Performance Test Sheet. The pressure swing shall be 16 to 26 psig.

8. Adjust the UUT Inlet Press pressure to obtain a pressure of 35 ±1 psig. Adjust the OXYGEN OUTLET Flow to obtain 30 ±1 lpm.

9. If malfunction occurs, refer to troubleshooting (table 9-3).

10. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-34. OUTLET GAS PERFORMANCE TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY.

To perform outlet gas performance test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-5 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Adjust the OXYGEN OUTLET Flow to obtain a flow of 230 ±2 lpm.

5. If necessary, adjust the test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. Click Reset button of the STOPWATCH and allow concentrator to operate at least 5 minutes or until outlet pressures and oxygen concentrations stabilize. Listen for pressure cycling.

7. If necessary, set the OXYGEN OUTLET Pressure to read in psig. Record the average OXYGEN OUTLET Pressure on Performance Test Sheet. The average shall be greater than 20 psig.

8. Record the OXYGEN OUTLET Concentration percentages on Performance Test Sheet. The OXYGEN OUTLET Concentration shall be 25.7% minimum.

9. Record the NITROGEN OUTLET Concentration percentages on Performance Test Sheet. The NITROGEN OUTLET Concentration shall be 7.0% maximum.

10. Record NITROGEN OUTLET Flow on Performance Test Sheet. The average flow shall be 65.1 slpm minimum (0.166 lb/min minimum).

11. Set the OXYGEN OUTLET Flow to obtain a flow of 30 ±1 lpm.

12. Click Reset button of the STOPWATCH and allow concentrator to operate at least 10 minutes or until the oxygen concentrations stabilize. Record OXYGEN OUTLET Concentration percentage on Performance Test Sheet. The OXYGEN OUTLET Concentration shall be 83% minimum.

13. If malfunction occurs, refer to troubleshooting (table 9-4).

14. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-35. CONCENTRATOR SHUTDOWN TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY. To perform the concentrator shutdown test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-5 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Set the OXYGEN OUTLET Flow to a flow of 230 ±2 lpm.

5. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. Click Reset button of the STOPWATCH and allow concentrator to operate at least 1 minute.

7. Simultaneously place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position and click Reset button of the STOPWATCH. If UUT Reg Press (TP1) goes to less than 2 psig within 90 seconds, place a check mark in appropriate space on Performance Test Sheet.

8. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position. If pressure cycling resumes as indicated by the UUT Reg Press (TP1), place a check mark in appropriate space on Performance Test Sheet. Allow the concentrator to operate for at least 3 1/2 minutes.

9. In the CONTROL WORD 1 box; click -24 SYSTEM OFF until a √ is indicated in its box. Click SEND button and immediately click Reset button of the STOPWATCH. If UUT Reg Press (TP1) goes to less than 2 psig within 90 seconds and ARINC status word 1-20 (O_2N_2 System Shutdown) is set to 1, place a check mark in appropriate space on Performance Test Sheet.

10. In the CONTROL WORD 1 box; click -24 SYSTEM OFF until the √ is removed from the box and click SEND button.

11. Place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position and allow the concentrator to operate until the UUT REG PRESS goes to approximately zero.

12. If malfunction occurs, refer to troubleshooting (table 9-5).

13. If readings are within tolerance, wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-36. ARINC FUNCTIONAL TEST USING CONCENTRATOR CONTROLLER/MONITOR ONLY. To perform the ARINC functional test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-5 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Concentrator Controller/Monitor (paragraph 9-29).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to On.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Set the OXYGEN OUTLET Flow to a flow of 230 ±2 lpm.

5. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. From the Test Set Menu, set Test Mode Monitor (ARINC) on. Set OXYGEN OUTLET Pressure to read in psia.

7. Allow the concentrator to operate for a minimum of 15 minutes. Compare the following test set readings with the concentrator ARINC output readings and record on Performance Test Sheet. The concentrator readings shall be within the tolerances shown.

O_2 PRESS	± 3.0 psia
O_2 %	± 3.0%
CAB	± 10mmHg
N_2 %	± 1.5%
PPO_2	± 20mmHg

8. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position and allow the UUT REG Press (TP1) to bleed to approximately zero.

9. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position. If WARNING light (DS5) extinguishes within 3 minutes and no ARINC failures are indicated after 3 1/2 minutes (Status words 2-15, 2-16, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, and 2-24 are all 0), place a check mark in appropriate space on Performance Test Sheet.

10. Click -28 IBIT INITIATE in the CONTROL WORD 1 box located in the upper right corner of the screen until a √ is indicated in its box and then click SEND button. Verify that STATUS WORD 1 [1] -28 IBIT Prog is displayed.

11. After approximately 30-40 seconds, if [1] -29 IBIT Comp, [0] -28 IBIT Prog, and [0] -27 IBIT Fail is displayed in the STATUS WORD 1 box. (IBIT Complete.), place a check mark in appropriate space on Performance Test Sheet.

12. Click -27 MBIT INITIATE in the CONTROL WORD 1 box located in the upper right corner of the screen until a √ is indicated in its box and then click SEND button. Verify that STATUS WORD 1 [1] -16 MBIT Prog is displayed after a few seconds.

13. After approximately 5 1/2 minutes, if [1] -17 MBIT Comp, [0] -16 MBIT Prog, and [0] -15 MBIT Fail is displayed in the STATUS WORD 1 box. (MBIT Complete.), place a check mark in appropriate space on Performance Test Sheet.

14. Set the OXYGEN OUTLET Flow to a flow of 75.0 ±5 lpm. If necessary, set the OXYGEN OUTLET PRESSURE to read in psia.

15. Set UUT INLET Press to 11 psig. Slowly adjust the UUT INLET Press by pressing the ↓ arrow until the STATUS WORD 2 box displays [1] - 21 Low O_2 Press. Record OXYGEN OUTLET Pressure on Performance Test Sheet. The pressure shall be between 19 and 23 psia.

16. Set the OXYGEN OUTLET Pressure to read in psig.

17. If malfunction occurs, refer to troubleshooting (table 9-6).

18. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect concentrator from the test set.

9-37. TEST SET SETUP USING TEST SET CONTROLLER/MONITOR ONLY.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry Compound	—

Support Equipment Required

Quantity	Description	Reference Number
1	O_2N_2 Concentrator Test Set	3300204-6101 (CAGE 99251)
1	Silencer Assembly, Exhaust (Muffler, Exhaust)	901-225-017-101 (CAGE 77272)
1	Surge Suppressor	—

1. Ensure both test set lids are removed.

2. Ensure test set circuit breaker 115 VAC ON/OFF (CB1), switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) are in OFF position.

3. Remove all hoses, cables, and adapters from lid of the test set. Remove muffler and computer from test set front panel.

4. Remove protective caps, dust cap, and shipping plugs from the concentrator.

WARNING

Hazardous voltages may be present on case of test set if power plug and source are not connected to safety ground.

NOTE

Refer to figure 9-4 for O_2N_2 concentrator interfaces.

Unless otherwise specified, refer to figure 9-8.

5. Connect the one end of test set power cable (P/N 3309146-1) to test set 115 VAC (J1) and other end to the surge suppressor.

6. Connect the one end of test set computer (P/N 3309268-1) power supply to the computer and other end to the surge suppressor and connect the surge suppressor to a 115 V, 60 Hz power source.

7. Connect one end of test set cable assembly (P/N 3309386-1) to the portable computer and the other end to test set TO COMPUTER (J3).

8. Connect hose assembly (P/N 3309201-1) to test set MONITOR PNEUMATICS (J12). Connect other end of hose assembly (P/N 3309201-1) to PSA pneumatic connector on concentrator.

9. Connect connector assembly (P/N 3308193-1) to concentrator N_2 outlet port. Connect the hose assembly (P/N 3309243-1) from connector assembly (P/N 3308193-1) on the N_2 outlet port to the test set plenum (J13).

10. Connect the hose assembly (P/N 3309243-1) from the test set plenum port (J15) to the test set panel N_2 FROM PLENUM port (J8).

11. Connect fitting assembly (P/N 3309199-2) to the O_2 outlet port. Connect the hose assembly (P/N 3309243-2) from fitting assembly (P/N 3309199-2) connected to the O_2 outlet port on the concentrator to the test set plenum (J14).

12. Connect the hose assembly (P/N 3309243-2) from the test set plenum (J16) to the test set panel O_2 FROM PLENUM port (J9).

13. Connect fitting assembly (P/N 3309199-1) to air inlet port. Connect the hose assembly (P/N 3309243-4) from the test set front panel AIR TO CONCENTRATOR port (J7) to fitting assembly (P/N 3309199-1) connected to air inlet port on the concentrator.

14. Connect the air source to the test set AIR INLET PRESSURE port (J4). Turn on the compressor.

15. Remove the test port plug from the concentrator pressure reducer at TP1 port and connect the test set hose assembly (P/N 3309219-1) between the concentrator TP1 port and the test set TEST PORT (J11).

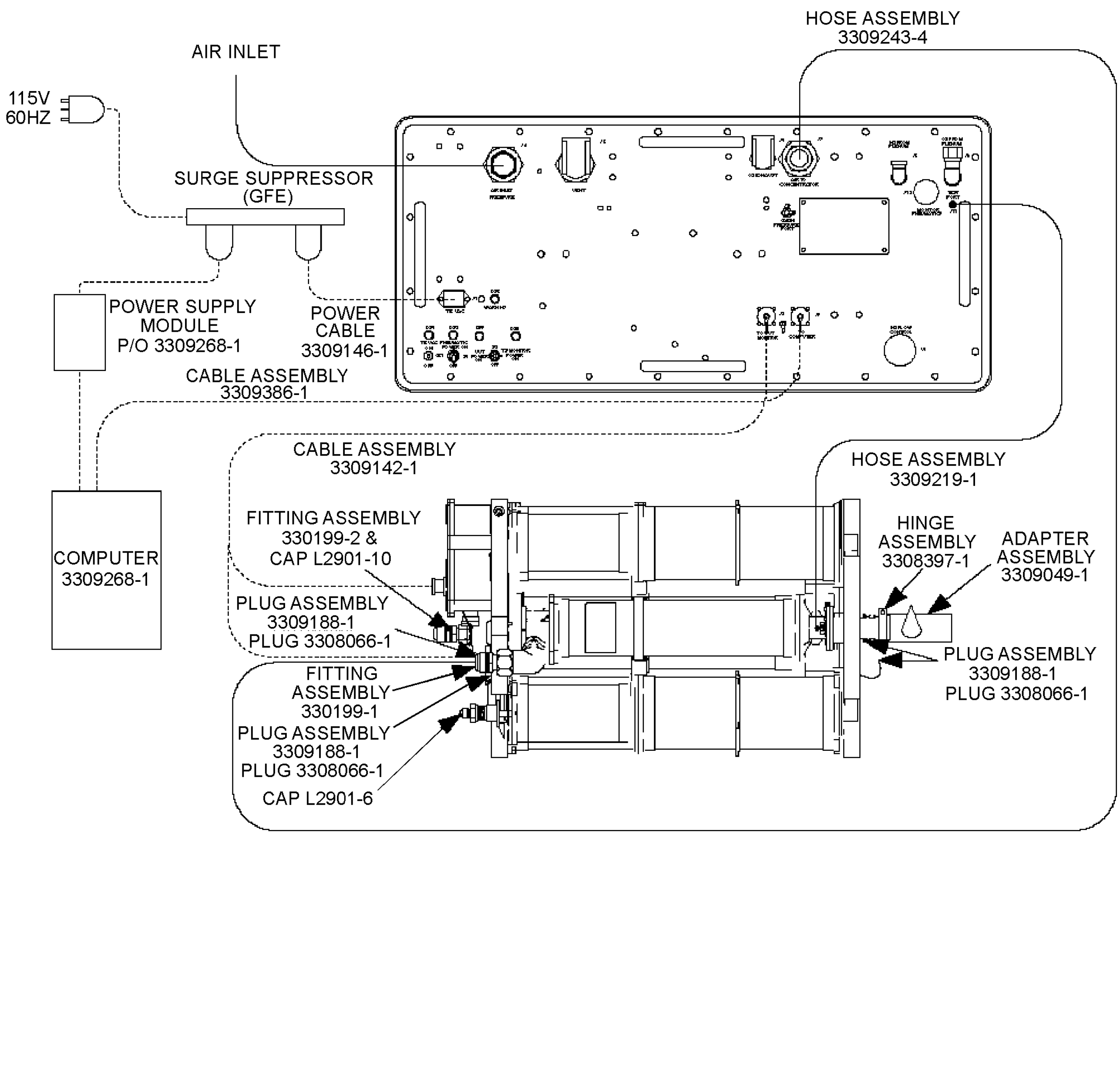


Figure 9-7. O_2N_2 Concentrator Performance Test Setup Using Concentrator Controller/Monitor Only (Leakage Test)

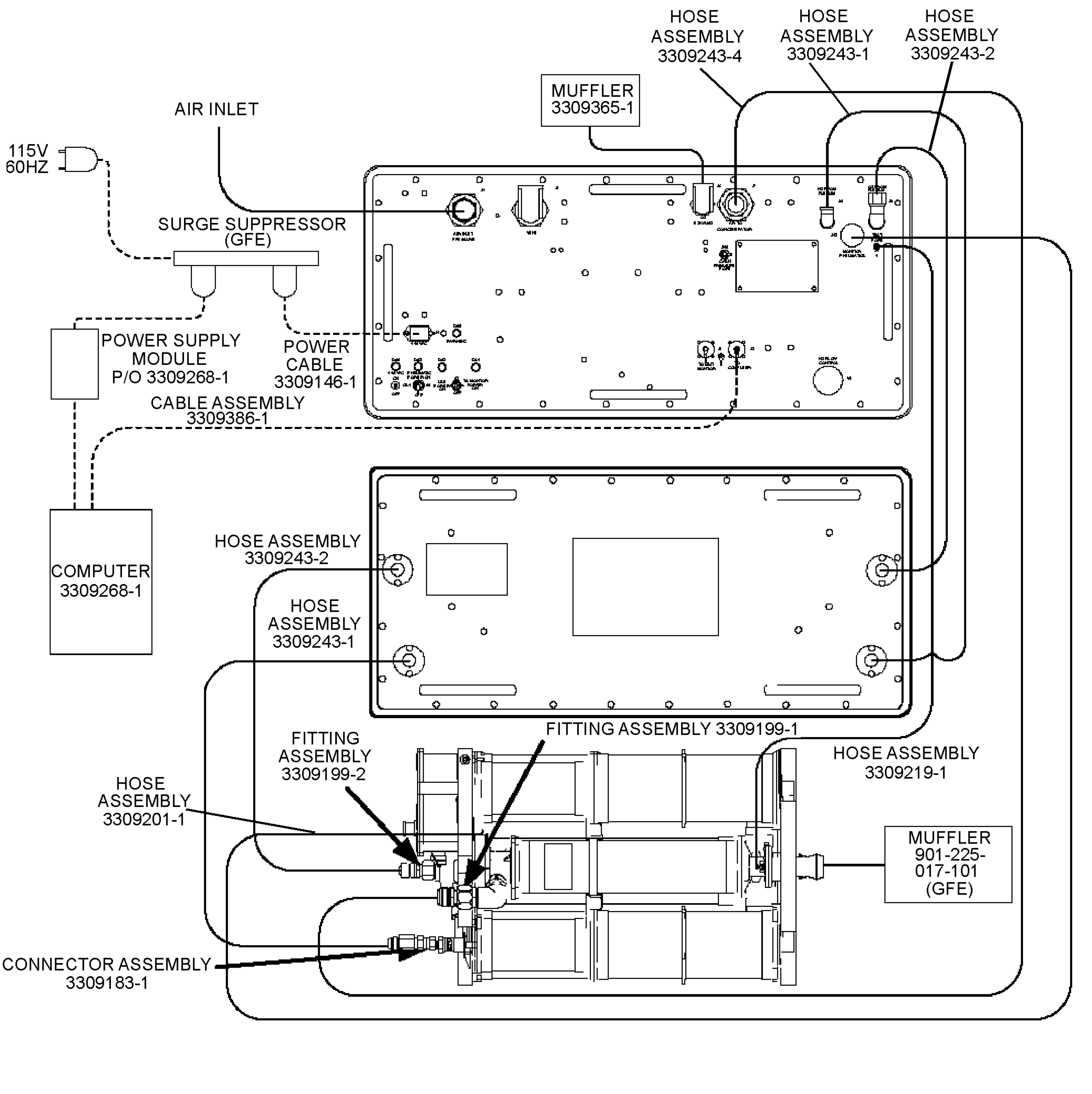


Figure 9-8. O_2N_2 Concentrator Performance Test Setup Using Test Set Controller/Monitor Only (Normal)

16. Connect the muffler (P/N 3309365-1) to the test set O_2 EXHAUST port (J6).

17. Connect the GFE supplied muffler (P/N 901-225-017-101) to the exhaust on the concentrator.

18. Place the computer power switch to the ON position.

19. Place the test set 115 VAC ON/OFF circuit breaker (CB1) to ON.

20. When Windows starts, select the V22 TS icon to start the program.

NOTE

Refer to figure 9-6 for reference O_2N_2 concentrator test set display.

The test set requires a 15-minute warmup period (after 115 VAC ON/OFF (CB1) is turned on) to achieve the specified accuracy. Wait for the T/S Ready light to turn green prior to performing any concentrator acceptance testing.

21. Wait until the TEST SET Warmup counts down to zero, and the T/S Ready light is green.

22. The default screen will appear. Enter the concentrator Serial Number.

23. Refer to the appropriate test for further instructions.

CAUTION

To extend the life of the electronic regulators used in this test set, switch PNEUMATIC POWER ON/OFF (S1) should be in OFF position when concentrator testing or troubleshooting is not in progress.

24. When concentrator testing or troubleshooting is not in progress, set switch PNEUMATIC POWER ON/OFF (S1) to the OFF position.

25. The data files for each test are stored automatically on the computer hard drive in the folder C:\V22_TS\SN\Individual_Test or C:\V22_TS\SN\Acceptance_Test. The file name is then SN.TEST Letter Run#. The file name is the concentrator serial number followed by a file extension that identifies the specific test and the number of times that this has been performed (SN.TEST Letter Run#).

26. For example: C:\V22-TS\001\Individual_Test\001.a03 would indicate the third time the leakage test has been performed on serial number 001.

27. After all concentrator testing is complete, use the Windows file manager to copy all files associated with that particular serial number to a 3-1/2-inch floppy disk. This disk, along with the completed data sheet, will form a permanent record for each concentrator.

9-38. AUTOMATED PERFORMANCE TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform the automated performance test (****Run All Tests****), proceed as follows:

NOTE

****Run All Tests**** test runs the leakage, pressure reducer, outlet gas performance, concentrator shutdown, and ARINC functional test in sequence. Data from the tests is saved to C:\V22_TS\SN\Acceptance_Test. For a description of each test, refer to the appropriate section below.

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Click CONCENTRATOR TEST SELECT menu.

3. Using the mouse, click **** Run All Tests **** and click START. This will activate the test set to perform the testing sequence. During this test, manual instructions will appear on the monitor screen. Follow these instructions as they appear. At the completion of this test, the monitor screen will indicate passed or failed. If a failed indication is displayed, click appropriate tab (example: (A) Leakage Test) to the right of the Notes tab. The Notes text will display information as to the failure(s) that occurred. If failure occurs, refer to appropriate troubleshooting table.

NOTE

After repair or replacement of malfunctioning or damaged parts, the failed test may be run by performing an automated individual test to verify the successful completion of the repair or replacement of parts.

9-39. AUTOMATED INDIVIDUAL TESTS USING TEST SET CONTROLLER/MONITOR ONLY. Each test may be run individually in the automated mode. To perform an individual automated test, proceed as follows:

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Click CONCENTRATOR TEST SELECT menu.

3. Using the mouse, click the appropriate individual test (example: (A) Leakage Test) and click START. This will activate the test set to perform the testing sequence. During this test, manual instructions will appear on the monitor screen. Follow these instructions as they appear. At the completion of this test, the monitor screen will indicate passed or failed. If a failed indication is displayed, click appropriate tab (example: (A) Leakage Test) to the right of the Notes tab. The Notes text will display information as to the failure(s) that occurred. Refer to figures 9-4 and 9-8 during testing for correct leakage test setup. If failure occurs, refer to appropriate troubleshooting table.

NOTE

Paragraphs 9-40 through 9-44 contain procedural steps for testing of the concentrator manually for each individual test. The following tests are identical to the automated tests described above but will allow operator interaction.

9-40. LEAKAGE TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform the leakage test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-9 during testing for correct leakage test setup.

1. Ensure the test setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Remove the GFE supplied muffler (P/N 901-225-017-101) from the concentrator and plug the concentrator exhaust port using the adapter assembly (P/N 3309049-1) and the hinge assembly (P/N 3308397-1). Place the valve on adapter assembly (P/N 3309049-1) to the CLOSED position.

3. Disconnect the concentrator O_2 tubing from the O_2 barb at the concentrator plenum and disconnect the concentrator N_2 tubing from the N_2 barb. Plug the N_2 and O_2 tubing with the plugs (P/N 3308066-1) and plug the O_2 and N_2 barbs with plug assembly (P/N 3309188-1).

4. Disconnect hose assembly (P/N 3309243-1) with connector assembly (P/N 3309183-1) attached from concentrator N_2 Outlet port. Disconnect hose assembly (P/N 3309243-2) from fitting assembly (P/N 3309199-2). Cap the N_2 Outlet port on the concentrator with the cap (P/N L2901-6) and cap the O_2 Outlet port on the concentrator with the fitting assembly (P/N 3309199-2) and cap (P/N L2901-10).

5. Remove the concentrator EXH tubing from the concentrator EXH barb and plug the concentrator EXH tube barb with the plug assembly (P/N 3309188-1).

6. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

7. Adjust the UUT Inlet Press to obtain a pressure of 35 ± 1 psig. Click Reset button of the STOPWATCH and pressurize the concentrator for 3 minutes. After 3 minutes, plug the tubing labeled EXH with a tube plug (P/N 3308066-1).

8. Record initial UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

9. Click UUT On/Off to off and click Reset button of the STOPWATCH.

10. After 5 minutes, record UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

11. Record difference between steps 8 and 10 on Performance Test Sheet. The difference between the two readings shall not exceed 8 psi.

12. Slowly move the valve on the adapter assembly to the OPEN position.

13. Remove the test set plugs (P/N 3308066-1) and plug assemblies (P/N 3309188-1) from the concentrator O_2 and N_2 barbs and tubing.

14. Remove the test set plug (P/N 3308066-1) and plug assembly (P/N 3309188-1) from the EXH port and tubing. Reconnect the EXH tubing to the EXH barb on the concentrator exhaust tube.

15. Remove the hinge assembly (P/N 3308397-1) and the adapter assembly (P/N 3309049-1). Reconnect the GFE supplied muffler (901-225-017-101) to the concentrator exhaust port.

16. Remove the caps (P/N L2901-10 and P/N L2901-6) and from the concentrator O_2 and N_2 outlet ports. Reconnect the tubing to the O_2 and N_2 barbs.

17. Reconnect connector assembly (P/N 3309183-1) with hose (P/N 3309243-1) attached to concentrator N_2 outlet port. Disconnect end of hose assembly (P/N 3309243-1) connected to plenum port (J13) and connect adapter assembly (P/N 3309340-1) to test set hose assembly.

18. Connect leakage hose assembly (P/N 3309215-1) to adapter assembly. Disconnect hose from test set TEST PORT (J11) and connect leakage hose assembly to test set TEST PORT (J11).

19. Adjust the UUT Inlet Press to obtain a pressure of 27 ±1 psig.

20. From the Test Set menu, set J11 Test Pressure On. Click Start button of the STOPWATCH.

21. After two minutes, set J11 Test Pressure off. Set UUT Inlet Press to 0.0 psig.

22. Record initial UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

23. Click Reset button of the STOPWATCH.

24. After 5 minutes, record UUT Reg Press (TP1) pressure reading on Performance Test Sheet.

25. Record difference between steps 22 and 24 on Performance Test Sheet. The difference between the two readings shall be less than 5 psi.

26. Disconnect leakage hose assembly from test set TEST PORT (J11) and adapter assembly. Reconnect hose from concentrator TP1 to test set TEST PORT (J11). Remove adapter assembly.

27. Reconnect the test set hoses between plenum assembly and concentrator O_2 and N_2 outlet ports.

28. If malfunction occurs, refer to troubleshooting (table 9-7).

29. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-41. PRESSURE REDUCER TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform the pressure reducer test in the manual mode, proceed as follows:

NOTE

Refer to figure figures 9-4 and 9-8 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

3. Set the OXYGEN OUTLET Flow to obtain 230 ±2 lpm.

4. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

5. Record UUT Reg Press (TP1) pressure reading on Performance Test Sheet. The pressure swing shall be 20 to 30 psig.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

6. Adjust the UUT Inlet Press to obtain a pressure of 25 +0,-1 psig.

7. Record UUT Reg Press (TP1) pressure reading on Performance Test Sheet. The pressure swing shall be 16 to 26 psig.

8. Adjust the UUT Inlet Press pressure to obtain a pressure of 35 ±1 psig. Adjust the OXYGEN OUTLET Flow to obtain 30 ±1 lpm.

9. If malfunction occurs, refer to troubleshooting (table 9-8).

10. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-42. OUTLET GAS PERFORMANCE TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform outlet gas performance test in the manual mode, proceed as follows:

NOTE

Refer to figure figures 9-4 and 9-8 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Adjust the OXYGEN OUTLET Flow to obtain a flow of 230 ±2 lpm.

5. If necessary, adjust the test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. Click Reset button of the STOPWATCH and allow concentrator to operate at least 5 minutes or until outlet pressures and oxygen concentrations stabilize. Listen for pressure cycling.

7. If necessary, set the OXYGEN OUTLET Pressure to read in psig. Record the average OXYGEN OUTLET Pressure on Performance Test Sheet. The average shall be greater than 20 psig.

8. Record the OXYGEN OUTLET Concentration percentages on Performance Test Sheet. The OXYGEN OUTLET Concentration shall be 25.7% minimum.

9. Record the NITROGEN OUTLET Concentration percentages on Performance Test Sheet. The NITROGEN OUTLET Concentration shall be 7.0% maximum.

10. Record NITROGEN OUTLET Flow on Performance Test Sheet. The average flow shall be 65.1 slpm minimum (0.166 lb/min minimum).

11. Set the OXYGEN OUTLET Flow to obtain a flow of 30 ±1 lpm.

12. Click Reset button of the STOPWATCH and allow concentrator to operate at least 10 minutes or until the oxygen concentrations stabilize. Record OXYGEN OUTLET Concentration percentage on Performance Test Sheet. The OXYGEN OUTLET Concentration shall be 83% minimum.

13. If malfunction occurs, refer to troubleshooting (table 9-9).

14. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-43. CONCENTRATOR SHUTDOWN TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform the concentrator shutdown test in the manual mode, proceed as follows:

NOTE

Refer to figure figures 9-4 and 9-8 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to on.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Set the OXYGEN OUTLET Flow to a flow of 230 ±2 lpm.

5. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. Click Reset button of the STOPWATCH and allow concentrator to operate at least 1 minute.

7. Simultaneously place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position and click Reset button of the STOPWATCH. If UUT Reg Press (TP1) goes to less than 2 psig within 90 seconds, place a check mark in appropriate space on Performance Test Sheet.

8. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position. If pressure cycling resumes as indicated by the UUT Reg Press (TP1), place a check mark in appropriate space on Performance Test Sheet. Allow the concentrator to operate for at least 3 1/2 minutes.

9. In the CONTROL WORD 1 box; click -24 SYSTEM OFF until a √ is indicated in its box. Click SEND button and immediately click Reset button of the STOPWATCH. If UUT Reg Press (TP1) goes to less than 2 psig within 90 seconds and ARINC status word 1-20 (O_2N_2 System Shutdown) is set to 1, place a check mark in appropriate space on Performance Test Sheet.

10. In the CONTROL WORD 1 box; click -24 SYSTEM OFF until the √ is removed from the box and click SEND button.

11. Place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position and allow the concentrator to operate until the UUT REG PRESS goes to approximately zero.

12. If malfunction occurs, refer to troubleshooting (table 9-10).

13. If readings are within tolerance, wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect the concentrator from the test set.

9-44. ARINC FUNCTIONAL TEST USING TEST SET CONTROLLER/MONITOR ONLY. To perform the ARINC functional test in the manual mode, proceed as follows:

NOTE

Refer to figures 9-4 and 9-8 during testing for correct test setup.

1. Ensure the setup has been completed, refer to Test Set Setup Using Test Set Controller/Monitor (paragraph 9-37).

2. Place switch PNEUMATIC POWER ON/OFF (S1) and switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position and click UUT On/Off to On.

NOTE

Adjust the UUT Inlet Press by pressing the Inlet Press button, place mouse cursor in box, click left mouse button, enter desired pressure, and press UUT Set Press button or by pressing the ↑ or ↓ arrows to obtain a pressure.

3. Adjust the UUT Inlet Press to obtain a pressure of 35.0 ±1 psig.

NOTE

Adjust the OXYGEN OUTLET Flow by pressing the OXYGEN OUTLET Flow button, place mouse cursor in box, click left mouse button, enter desired flow, and press OXYGEN OUTLET Set Flow button or by pressing the ↑ or ↓ arrows to obtain a flow.

4. Set the OXYGEN OUTLET Flow to a flow of 230 ±2 lpm.

5. If necessary, adjust test set panel N_2 FLOW CONTROL valve (V1) until the NITROGEN OUTLET Pressure is 2.0 ±0.25 psig.

6. From the Test Set Menu, set Test Mode Monitor (ARINC) on. Set OXYGEN OUTLET Pressure to read in psia.

7. Allow the concentrator to operate for a minimum of 15 minutes. Compare the following test set readings with the concentrator ARINC output readings and record on Performance Test Sheet. The concentrator readings shall be within the tolerances shown.

O_2 PRESS	± 3.0 psia
O_2 %	± 3.0%
CAB	± 10mmHg
N_2 %	± 1.5%
PPO_2	± 20mmHg

8. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position and allow the UUT REG Press (TP1) to bleed to approximately zero.

9. Place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the ON position. If WARNING light (DS5) extinguishes within 3 minutes and no ARINC failures are indicated after 3 1/2 minutes (Status words 2-15, 2-16, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, and 2-24 are all 0), place a check mark in appropriate space on Performance Test Sheet.

10. Click -28 IBIT INITIATE in the CONTROL WORD 1 box located in the upper right corner of the screen and then click SEND button. Verify that STATUS WORD 1 [1] -28 IBIT Prog is displayed.

11. After approximately 30-40 seconds, if [1] -29 IBIT Comp, [0] -28 IBIT Prog, and [0] -27 IBIT Fail is displayed in the STATUS WORD 1 box. (IBIT Complete.), place a check mark in appropriate space on Performance Test Sheet.

12. Click -27 MBIT INITIATE in the CONTROL WORD 1 box located in the upper right corner of the screen and then click SEND button. Verify that STATUS WORD 1 [1] -16 MBIT Prog is displayed after a few seconds.

13. After approximately 5 1/2 minutes, if [1] -17 MBIT Comp, [0] -16 MBIT Prog, and [0] -15 MBIT Fail is displayed in the STATUS WORD 1 box. (MBIT Complete.), place a check mark in appropriate space on Performance Test Sheet.

14. Set the OXYGEN OUTLET Flow to a flow of 75.0 ±5 lpm. If necessary, set the OXYGEN OUTLET PRESSURE to read in psia.

15. Set UUT INLET Press to 11 psig. Slowly adjust the UUT INLET Press by pressing the ↓ arrow until the STATUS WORD 2 box displays [1] - 21 Low O_2 Press. Record OXYGEN OUTLET Pressure on Performance Test Sheet. The pressure shall be between 19 and 23 psia.

16. Set the OXYGEN OUTLET Pressure to read in psig.

17. If malfunction occurs, refer to troubleshooting (table 9-11).

18. If readings are within tolerance, place switch PNEUMATIC POWER ON/OFF (S1) to the OFF position. Wait until no audible flow from the concentrator is evident, and then place switch UUT POWER ON/OFF/TS MONITOR POWER ON (S2) to the OFF position. Disconnect concentrator from the test set.

9-45. TROUBLESHOOTING.

9-46. Troubleshooting is prepared in a logical sequence. Due to the complex wiring, each step will identify the type of test or inspection, with tolerances, to be performed with the expected end results. All tests and steps permit only two outcomes. Each item to be replaced is identified in replacement steps. After performing a repair task, recheck the operation of the concentrator component. If the malfunction is corrected, that is the end of the procedure; if not, proceed to the next step in the troubleshooting table or to the next troubleshooting table indicated. Once the malfunction has been corrected, return to bench test procedures and continue testing the concentrator. Troubleshoot the concentrator using the procedure outlined in tables 9-2 through 9-11.

Materials Required

Quantity	Description	Reference Number
As Required	Air, Pressurized, Clean and Dry	—
As Required	Compound, Leak Detection	MIL-PRF-25567, Type I

Support Equipment Required

Quantity	Description	Reference Number
1	Multimeter	Type 77/BN or equivalent (CAGE 89536)
1	Test Lead Wire	ALB24RED or equivalent (CAGE 05276)
1	Test Lead Wire	ALB24BLACK or equivalent (CAGE 05276)

Table 9-2. Troubleshooting (Leakage Test) using Concentrator Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-30. Step 3 Failed indication is displayed.	See below.	Isolate by performing leakage test (paragraph 9-32).
9-32. Step 11 Internal/external leakage exceeds 8 psig in 5 minutes.	Foreign material, dirt, loose screws, defective preformed packing, or other damage. Check valve assemblies defective.	Isolate by performing steps below.
NOTE Ensure all test hose assemblies from test setup to concentrator are properly attached and not leaking. 1. Using leak detection compound, inspect concentrator for external leakage. a. If external leak is detected as indicated by bubbles, visually inspect for foreign matter, defective component parts, or other obvious damage; clean, repair, or replace component parts as necessary and perform bench test. b. If no external leak is detected, then proceed to step 2. 2. If leakage is suspected of being internal, then perform the following: a. If check valve assemblies were not replaced in step 1a, then remove check valve assemblies CV1 and CV2 (paragraph 9-50) and check valve assemblies CV3 and CV4 (paragraph 9-51). Replace check valve assemblies CV1 and CV2 (paragraph 9-82) and check valve assemblies CV3 and CV4 (paragraph 9-81) and perform bench test. b. If internal leakage is still suspected, remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.		
9-32. Step 25 Internal/external leakage exceeds 5 psig in 5 minutes.	Check valve (CV5) faulty.	Remove faulty check valve (CV5) (paragraph 9-51) and replace check valve (CV5) (paragraph 9-81)

Table 9-3. Troubleshooting (Pressure Reducer Test) using Concentrator Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-30. Step 3 Failed indication is displayed.	See below.	Isolate by performing pressure reducer test (paragraph 9-33).
9-33. Step 5 UUT Reg Press (TP1) indication less than 20.	Inlet pressure low.	Ensure UUT Inlet Press is 35 ±1 psig.
	Filter (FLTR1) clogged.	Replace faulty filter (FLTR1) (paragraph 9-84).
	Shutoff valve (V1) faulty.	Perform concentrator shutdown test (paragraph 9-35).
	Pressure reducer (REG1) adjusted incorrectly.	Adjust setscrew on reducer assembly for 25 ±1 psig. Refer to Figure 9-4. (turn setscrew clockwise to increase pressure) (turn setscrew counterclockwise to decrease pressure)
	Leakage.	Perform leakage test (paragraph 9-32).

Table 9-3. Troubleshooting (Pressure Reducer Test) Using Concentrator Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
9-33. Step 5 UUT Reg Press (TP1) indication greater than 30.	Inlet pressure high. Pressure reducer (REG1) adjusted incorrectly.	Ensure UUT Inlet Press is 35 ±1 psig. Adjust setscrew on reducer assembly for 25 ±1 psig. Refer to figure 9-4. (turn setscrew clockwise to increase pressure) (turn setscrew counterclockwise to decrease pressure)
9-33. Step 7 UUT Reg Press (TP1) indication less than 16.	Inlet pressure low. Filter (FLTR1) clogged. Shutoff valve (V1) faulty. Leakage.	Ensure UUT Inlet Press is 25 +0,-1 psig. Replace faulty filter (FLTR1) (paragraph 9-84). Perform concentrator shutdown test (paragraph 9-35). Perform leakage test (paragraph 9-32).
9-33. Step 7 UUT Reg Press (TP1) indication greater than 26.	Inlet pressure high.	Ensure UUT Inlet Press is 25 +0,-1 psig.

Table 9-4. Troubleshooting (Outlet Gas Performance Test) Using Concentrator Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-30. Step 3 Failed indication is displayed.	See below.	Isolate by performing outlet gas performance test (paragraph 9-34).
9-34. Step 6 No pressure cycles (high to low flow) at output of concentrator.	Faulty controller/monitor assembly. Slide valve assembly (V2).	Isolate by performing steps below.

1. Set test set switch S2 to the OFF position. Disconnect (P1) of test set cable P/N 3309142-1 from controller/monitor assembly. Connect multimeter set to measure 28 VDC between pins (D) (+) and (C) (-). Set test set switch S2 to the ON position and measure 28VDC.

   a. If voltage is not present, return test set for maintenance.

   b. If voltage is present, proceed to step 2.

2. Set test set switch S2 to the OFF position. Disconnect multimeter from between pins (D) (+) and (C) (-). Connect (P1) of test set cable P/N 3309142-1 to controller/monitor assembly. Set test set switch S2 to the ON position, proceed to step 3.

3. Disconnect labeled plastic tubing V2 from both sides of slide valve assembly tube fittings and check for pressure from end of one labeled plastic tubing; and during operation of controller/monitor assembly, ensure that pressure is cycling alternately between labeled plastic tubings V2.

   a. If pressure is not present or is not cycling from labeled plastic tubings V2 on slide valve, remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.

Table 9-4. Troubleshooting (Outlet Gas Performance Test) using Concentrator Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
b. If pressure is present and is cycling from labeled plastic tubings V2, then remove slide valve assembly (V2) (paragraph 9-60), install new slide valve assembly (V2) (paragraph 9-72), and perform bench test.		
9-34. Step 7 Oxygen outlet pressure is less than 20 psig.	Inlet pressure low. Pressure reducer (REG1). Oxygen sieve beds (BED 1 O_2 and BED 2 O_2).	Isolate by performing steps below.
1. If UUT Inlet Press pressure is low, then check for low facility air pressure or adjust UUT Inlet Press for 35 ± 1 psig pressure and continue bench test. 2. If UUT Reg Press (TP1) pressure is low, then perform pressure reducer test (paragraph 9-33). 3. If UUT Reg Press (TP1) pressure is within limits, then remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.		
9-34. Step 8 Oxygen outlet O_2 concentration percentage not within limits.	Inlet pressure low. Outlet flow rate adjustment. Check valves (CV1 and CV2). Sieve beds.	Isolate by performing steps below.
1. Check inlet pressure, then adjust as required and continue bench test. 2. Check outlet flow rates, then adjust as required and continue bench test. 3. Observe test set display for O_2 percentage; if O_2 outlet oxygen concentration percentage is low, then perform the following steps: a. Remove faulty check valves (CV1 and CV2) (paragraph 9-50), install check valves (CV1 and CV2) (paragraph 9-82), and perform bench test. b. Remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.		
9-34. Step 9 Nitrogen outlet O_2 concentration percentages not within limits.	Inlet pressure low. Outlet flow rate adjustment. Check valves (CV3 and CV4). Sieve beds.	Isolate by performing steps below.
1. Check inlet pressure, then adjust as required and continue bench test. 2. Check outlet flow rates, then adjust as required and continue bench test. 3. Observe test set display for low N_2 percentages, if N_2 outlet oxygen concentration percentages is low, then perform the following steps: a. Remove faulty check valves (CV3 and CV4) (paragraph 9-51), install check valves (CV3 and CV4) (paragraph 9-81), and perform bench test. b. Remove faulty nitrogen bed assemblies (right and left) (paragraph 9-61), replace nitrogen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.		
9-34. Step 10 Nitrogen outlet flow is less than expected rate.	Outlet flow rate adjustment. Check valve (CV5). Check valves (CV3 through CV4).	Isolate by performing steps below.
1. Check outlet flow rate, then adjust flow rate as required and continue bench test.		

Table 9-4. Troubleshooting (Outlet Gas Performance Test) Using Concentrator Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
2. Observe test set NITROGEN OUTLET Flow display for low nitrogen flow, if flow is low, perform the following: a. Remove faulty check valve (CV5) (paragraph 9-51), replace check valve (CV5) (paragraph 9-81), and perform bench test. b. Remove faulty check valves (CV3 and CV4) (paragraph 9-51), install check valves (CV3 and CV4) (paragraph 9-81), and perform bench test.		
9-34. Step 12 Oxygen concentration less than 83%.	Outlet flow rate adjustment. Check valves (CV1 and CV2). Sieve beds.	Isolate by performing steps below.
1. Check outlet flow rates and adjust as required. 2. Observe test set display for low O_2 percentage; if O_2 outlet oxygen concentration percentage is less than 83%, then perform the following steps: a. Remove faulty check valves (CV1 and CV2) (paragraph 9-50), install new check valves (CV1 and CV2) (paragraph 9-82), and perform bench test. b. Remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set and perform bench test.		

Table 9-5. Troubleshooting (Concentrator Shutdown Test) Using Concentrator Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-30. Step 3 Failed indication is displayed.	See below.	Isolate by performing concentrator shutdown test (paragraph 9-35).
9-35. Step 7 Pressure indication does not go to less than 2 psig when test set UUT POWER ON/OFF (S2) switch is turned off.	Shutoff valve (V1). Controller/monitor assembly.	Isolate by performing steps below.
1. Observe UUT Reg Press (TP1) pressure, then remove labeled plastic tubing V1 from back of controller/monitor assembly at tube retainer disc assembly: a. If pressure is not present, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test. b. If pressure is present, then remove shutoff/filter/regulator assembly (paragraph 9-53), disassemble shutoff valve/filter assembly (V1) (paragraph 9-54), replace faulty parts, reassemble shutoff valve/filter assembly (V1) (paragraph 9-77), install shutoff/filter/regulator assembly (paragraph 9-79), and perform bench test.		
9-35. Step 8 No pressure cycles (high to low flow) at output of concentrator.	Controller/monitor assembly. Slide valve assembly (V2).	Isolate by performing steps below.
1. Set test set switch S2 to the OFF position. Disconnect (P1) of test set cable P/N 3309142-1 from controller/monitor assembly. Connect multimeter set to measure 28 VDC between pins (D) (+) and (C) (-). Set test set switch S2 to the ON position and measure 28 VDC. a. If voltage is not present, return test set for repair. b. If voltage is present, proceed to step 2.		

Table 9-5. Troubleshooting (Concentrator Shutdown Test) using Concentrator Controller/Monitor (Cont)

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td colspan="3">2. Set test set switch S2 to the OFF position. Disconnect multimeter from between pins (D) (+) and (C) (-). Connect (P1) of test set cable P/N 3309142-1 to control ler/monitor assembly. Set test set switch S2 to the ON position, proceed to step 3.
3. Disconnect labeled plastic tubing V2 from both sides of slide valve assembly tube fittings and check for pressure from end of one labeled plastic tubing; and during operation of controller/monitor assembly, ensure that pressure is cycling alternately between labeled plastic tubings V2.
a. If pressure is not present or is not cycling from labeled plastic tubings V2 on slide valve, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
b. If pressure is present and is cycling from labeled plastic tubings V2, then remove faulty slide valve assembly (V2) (paragraph 9-60), install slide valve assembly (V2) (paragraph 9-72), and perform bench test.</td></tr>
<tr><td>9-35. Step 9
Pressure indication does not go to zero on proper ARINC command.</td><td>Shutoff valve (V1).
Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Observe UUT Reg Press (TP1) pressure, then remove labeled plastic tubing V1 from back of controller/monitor assembly at tube retainer disc assembly:
a. If pressure is not present, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
b. If pressure does not go to zero, then remove shutoff/filter/regulator assembly (paragraph 9-53), disassemble shutoff valve/filter assembly (V1) (paragraph 9-54), replace faulty parts, reassembly shutoff valve/filter assembly (V1) (paragraph 9-77), install shutoff/filter/regulator assembly (paragraph 9-79), and perform bench test.</td></tr>
</table>

Table 9-6. Troubleshooting (ARINC Functional Test) using Concentrator Controller/Monitor

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td>9-30. Step 3
Failed indication is displayed.</td><td>See below.</td><td>Isolate by performing ARINC functional test (paragraph 9-36).</td></tr>
<tr><td>9-36. Step 7
ARINC and concentrator readings do not agree.</td><td>Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. If ARINC and concentrator readings do not agree:
a. Connect test set internal controller/monitor as shown in figure 9-8, run ARINC functional test (paragraph 9-44), if fault is corrected then remove faulty control ler/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
b. If readings still do not agree return test set for maintenance.</td></tr>
<tr><td>9-36. Step 9
Discrete warning light did not go off within 3 minutes.</td><td>Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
</table>

Table 9-6. Troubleshooting (ARINC Functional Test) using Concentrator Controller/Monitor (Cont)

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td colspan="3">1. If discrete warning light did not go off within 3 minutes:
a. And test set UUT Oxygen Concentration indication is within limits, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
b. And test set UUT Oxygen Concentration indication is not within limits, then proceed to troubleshooting table 9-4.</td></tr>
<tr><td>9-36. Step 9
ARINC indicates failure(s).</td><td>Controller/monitor assembly.
PSA assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. If failure(s) are indicated by the ARINC after 3 minutes and all instrumentation is “OK”, connect test set internal controller/monitor as shown in figure 9-8, run ARINC functional test (paragraph 9-44), then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
2. If fault is still present, then proceed to troubleshooting table 9-4 and 9-5 for possible corrective action on the PSA assembly.</td></tr>
<tr><td>9-36. Step 11
I-BIT not complete or ARINC indicates failure(s).</td><td>Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. If I-BIT does not complete after 30 seconds, connect test set internal controller/monitor as shown in figure 9-8, run ARINC functional test (paragraph 9-44), if fault is corrected, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
2. If fault is still present, then proceed to troubleshooting table 9-4 and 9-5 for possible corrective action on the PSA assembly.</td></tr>
<tr><td>9-36. Step 13
M-BIT not complete or ARINC indicates failure(s).</td><td>Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. If M-BIT does not complete after 5 minutes and 30 seconds, connect test set internal controller/monitor as shown in figure 9-8, run ARINC functional test (paragraph 9-44), if fault is corrected, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
2. If fault is still present, then proceed to troubleshooting table 9-4 and 9-5 for possible corrective action on the PSA assembly.</td></tr>
<tr><td>9-36. Step 15
STATUS WORD 2 box does not display [1] - 21 Low O_2 Press or OXYGEN OUTLET Pressure not between 19 and 23 psia.</td><td>Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. STATUS WORD 2 box does not display [1] - 21 Low O_2 Press or OXYGEN OUTLET Pressure not between 19 and 23 psia, connect test set internal controller/ monitor as shown in figure 9-8, run ARINC functional test (paragraph 9-44), if fault is corrected, then remove faulty controller/monitor assembly (paragraph 9-49). Replace controller/monitor assembly (paragraph 9-83) and perform bench test.
2. If fault is still present, then proceed to troubleshooting table 9-4 and 9-5 for possible corrective action on the PSA assembly.</td></tr>
</table>

Table 9-7. Troubleshooting (Leakage Test) Using Test Set Controller/Monitor

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td>9-38. Step 3
Failed indication is displayed.</td><td>See below.</td><td>Isolate by performing leakage test (paragraph 9-40).</td></tr>
<tr><td>9-40. Step 11
Internal/external leakage exceeds 8 psig in 5 minutes.</td><td>Foreign material, dirt, loose screws, defective preformed packing, or other damage.
Check valve assemblies defective.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">NOTE

Ensure all test hose assemblies from test setup to concentrator are properly attached and not leaking.

1. Using leak detection compound, inspect concentrator for external leakage.

a. If external leak is detected as indicated by bubbles, visually inspect for foreign matter, defective component parts, or other obvious damage; clean, repair, or replace component parts as necessary and perform bench test.

b. If no external leak is detected, then proceed to step 2.

2. If leakage is suspected of being internal, then perform the following:

a. If check valve assemblies were not replaced in step 1a, then remove check valve assemblies CV1 and CV2 (paragraph 9-50) and check valve assemblies CV3 and CV4 (paragraph 9-51). Replace check valve assemblies CV1 and CV2 (paragraph 9-82) and check valve assemblies CV3 and CV4 (paragraph 9-81) and perform bench test.

b. If internal leakage is still suspected, return test set for maintenance.</td></tr>
<tr><td>9-40. Step 25
Internal/external leakage exceeds 5 psig in 5 minutes.</td><td>Check valve (CV5) faulty.</td><td>Remove faulty check valve (CV5) (paragraph 9-51) and replace check valve (CV5) (paragraph 9-81).</td></tr>
</table>

Table 9-8. Troubleshooting (Pressure Reducer Test) Using Test Set Controller/Monitor

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td>9-38. Step 3
Failed indication is displayed.</td><td>See below.</td><td>Isolate by performing pressure reducer test (paragraph 9-41).</td></tr>
<tr><td rowspan="5">9-41. Step 5
UUT Reg Press (TP1) indication less than 20.</td><td>Inlet pressure low.</td><td>Ensure UUT Inlet Press is 35 ±1 psig.</td></tr>
<tr><td>Filter (FLTR1) clogged.</td><td>Replace faulty filter (FLTR1) (paragraph 9-84).</td></tr>
<tr><td>Shutoff valve (V1) faulty.</td><td>Perform concentrator shutdown test (paragraph 9-35).</td></tr>
<tr><td>Pressure reducer (REG1) adjusted incorrectly.</td><td>Adjust setscrew on reducer assembly for 25 ±1 psig. Refer to figure 9-4.
(turn setscrew clockwise to increase pressure)
(turn setscrew counterclockwise to decrease pressure)</td></tr>
<tr><td>Leakage.</td><td>Perform leakage test (paragraph 9-32).</td></tr>
</table>

Table 9-8. Troubleshooting (Pressure Reducer Test) Using Test Set Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
9-41. Step 5 UUT Reg Press (TP1) indication greater than 30.	Inlet pressure high.	Ensure UUT Inlet Press is 35 ±1 psig.
	Pressure reducer (REG1) adjusted incorrectly.	Adjust setscrew on reducer assembly for 25 ±1 psig. Refer to figure 9-4. (turn setscrew clockwise to increase pressure) (turn setscrew counterclockwise to decrease pressure)
9-41. Step 7 UUT Reg Press (TP1) indication less than 16.	Inlet pressure low.	Ensure UUT Inlet Press is 25 +0, -1 psig.
	Filter (FLTR1) clogged.	Replace faulty filter (FLTR1) (paragraph 9-84).
	Shutoff valve (V1) faulty.	Perform concentrator shutdown test (paragraph 9-35).
	Leakage.	Perform leakage test (paragraph 9-32).
9-41. Step 7 UUT Reg Press (TP1) indication greater than 26.	Inlet pressure high.	Ensure UUT Inlet Press is 25 +0, -1 psig.

Table 9-9. Troubleshooting (Outlet Gas Performance Test) Using Test Set Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-38. Step 3 Failed indication is displayed.	See below.	Isolate by performing outlet gas performance test (paragraph 9-42).
9-42. Step 6 No pressure cycles (high to low flow) at output of concentrator.	Faulty controller/monitor assembly. Slide valve assembly (V2).	Isolate by performing steps below.

1. Set test set switch S2 to the OFF position. Disconnect (P1) of test set cable P/N 3309142-1 from controller/monitor assembly. Connect multimeter set to measure 28 VDC between pins (D) (+) and (C) (-). Set test set switch S2 to the UUT POWER ON position and measure 28VDC.
   a. If voltage is not present, return test set for maintenance.
   b. If voltage is present, proceed to step 2.
2. Set test set switch S2 to the OFF position. Disconnect multimeter from between pins (D) (+) and (C) (-). Set test set switch S2 to the TS MONITOR ON position, proceed to step 3.
3. Disconnect labeled plastic tubing V2 from both sides of slide valve assembly tube fittings and check for pressure from end of one labeled plastic tubing; and during operation of controller/monitor assembly, ensure that pressure is cycling alternately between labeled plastic tubings V2.
   a. If pressure is not present or is not cycling from labeled plastic tubings V2 on slide valve, return test set for maintenance.
   b. If pressure is present and is cycling from labeled plastic tubings V2, then remove slide valve assembly (V2) (paragraph 9-60) and install new slide valve assembly (V2) (paragraph 9-72).

Table 9-9. Troubleshooting (Outlet Gas Performance Test) Using Test Set Controller/Monitor (Cont)

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td>9-42. Step 7
Oxygen outlet pressure is less than 20 psig.</td><td>Inlet pressure low.
Pressure reducer (REG1).
Oxygen sieve beds (BED 1 O_2 and BED 2 O_2).</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. If UUT Inlet Press pressure is low, then check for low facility air pressure or adjust UUT Inlet Press for 35 ±1 psig pressure and continue bench test.
2. If UUT Reg Press (TP1) pressure is low, then perform pressure reducer test (paragraph 9-33).
3. If UUT Reg Press (TP1) pressure is within limits, then remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.</td></tr>
<tr><td>9-42. Step 8
Oxygen outlet O_2 concentration percentage not within limits.</td><td>Inlet pressure low.
Outlet flow rate adjustment.
Check valves (CV1 and CV2).
Sieve beds.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Check inlet pressure, then adjust as required and continue bench test.
2. Check outlet flow rates, then adjust as required and continue bench test.
3. Observe test set display for low O_2 percentage; if O_2 outlet oxygen concentration percentage is low, then perform the following steps:
a. Remove faulty check valves (CV1 and CV2) (paragraph 9-50), install check valves (CV1 and CV2) (paragraph 9-82), and perform bench test.
b. Remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.</td></tr>
<tr><td>9-42. Step 9
Nitrogen outlet O_2 concentration percentages not within limits.</td><td>Inlet pressure low.
Outlet flow rate adjustment.
Check valves (CV3 and CV4).
Sieve beds.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Check inlet pressure, then adjust as required and continue bench test.
2. Check outlet flow rates, then adjust as required and continue bench test.
3. Observe test set display for low N_2 percentages, if N_2 outlet oxygen concentration percentages is low, then perform the following steps:
a. Remove faulty check valves (CV3 and CV4) (paragraph 9-51), install check valves (CV3 and CV4) (paragraph 9-81), and perform bench test.
b. Remove faulty nitrogen bed assemblies (right and left) (paragraph 9-61), replace nitrogen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.</td></tr>
<tr><td>9-42. Step 10
Nitrogen outlet flow is less than expected rate.</td><td>Outlet flow rate adjustment.
Check valve (CV5).
Check valves (CV3 through CV4).</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Check outlet flow rate, then adjust flow rate as required and continue bench test.
2. Observe test set NITROGEN OUTLET flow display for low nitrogen flow, if flow is low, perform the following:
a. Remove faulty check valve (CV5) (paragraph 9-51), replace check valve (CV5) (paragraph 9-81), and perform bench test.</td></tr>
</table>

Table 9-9. Troubleshooting (Outlet Gas Performance Test) using Test Set Controller/Monitor (Cont)

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td colspan="3">b. Remove faulty check valves (CV3 and CV4) (paragraph 9-51), install check valves (CV3 and CV4) (paragraph 9-81), and perform bench test.</td></tr>
<tr><td>9-42. Step 12
Oxygen concentration less than 83%.</td><td>Outlet flow rate adjustment.
Check valves (CV1 and CV2).
Sieve beds.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Check outlet flow rates and adjust as required.
2. Observe test set display for low O_2 percentage; if O_2 outlet oxygen concentration percentage is less than 83%, then perform the following steps:
a. Remove faulty check valves (CV1 and CV2) (paragraph 9-50), install new check valves (CV1 and CV2) (paragraph 9-82), and perform bench test.
b. Remove faulty oxygen bed assemblies (right and left) (paragraph 9-61), replace oxygen bed assemblies (right and left) (paragraph 9-71) as a set, and perform bench test.</td></tr>
</table>

Table 9-10. Troubleshooting (Concentrator Shutdown Test) using Test Set Controller/Monitor

<table>
<tr><th>TROUBLE</th><th>PROBABLE CAUSE</th><th>REMEDY</th></tr>
<tr><td>9-38. Step 3
Failed indication is displayed.</td><td>See below.</td><td>Isolate by performing concentrator shutdown test (paragraph 9-43).</td></tr>
<tr><td>9-43. Step 7
Pressure indication does not go to less than 2 psig when test set UUT POWER ON/OFF (S2) switch is turned off.</td><td>Shutoff valve (V1). Controller/monitor assembly.</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Observe UUT Reg Press (TP1) pressure, then remove labeled plastic tubing V1 from back of controller/monitor assembly at tube retainer disc assembly:
a. If pressure is not present, return test set for maintenance.
b. If pressure is present, then remove shutoff/filter/regulator assembly (paragraph 9-53), disassemble shutoff valve/filter assembly (V1) (paragraph 9-54), replace faulty parts, reassembly shutoff valve/filter assembly (V1) (paragraph 9-77), install shutoff/filter/regulator assembly (paragraph 9-79), and perform bench test.</td></tr>
<tr><td>9-43. Step 8
No pressure cycles (high to low flow) at output of concentrator</td><td>Controller/monitor assembly.
Slide valve assembly (V2).</td><td>Isolate by performing steps below.</td></tr>
<tr><td colspan="3">1. Set test set switch S2 to the OFF position. Disconnect (P1) of test set cable P/N 3309142-1 from controller/monitor assembly. Connect multimeter set to measure 28 VDC between pins (D) (+) and (C) (-). Set test set switch S2 to the UUT POWER ON position and measure 28VDC.
a. If voltage is not present, return test set for maintenance.
b. If voltage is present, proceed to step 2.
2. Set test set switch S2 to the OFF position.. Disconnect multimeter from between pins (D) (+) and (C) (-). Set test set switch S2 to the TS MONITOR ON position, proceed to step 3.
3. Disconnect labeled plastic tubing V2 from both sides of slide valve assembly tube fittings and check for pressure from end of one labeled plastic tubing; and during operation of controller/monitor assembly, ensure that pressure is cycling alternately between labeled plastic tubings V2.</td></tr>
</table>

Table 9-10. Troubleshooting (Concentrator Shutdown Test) using Test Set Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
a. If pressure is not present or is not cycling from labeled plastic tubings V2 on slide valve, return test set for maintenance. b. If pressure is present and is cycling from labeled plastic tubings V2, then remove slide valve assembly (V2) (paragraph 9-60, install new slide valve assembly (V2) (paragraph 9-72), and perform bench test.		
9-43. Step 9 Pressure indication does not go to zero on proper ARINC command.	Shutoff valve (V1). Controller/monitor assembly.	Isolate by performing steps below.
1. Observe UUT Reg Press (TP1) pressure, then remove labeled plastic tubing V1 from back of controller/monitor assembly at tube retainer disc assembly: a. If pressure is not present, return test set for maintenance. b. If pressure does not go to zero, then remove shutoff/filter/regulator assembly (paragraph 9-53), disassemble shutoff valve/filter assembly (V1) (paragraph 9-54), replace faulty parts, reassembly shutoff valve/filter assembly (V1) (paragraph 9-77), install shutoff/filter/regulator assembly (paragraph 9-79), and perform bench test.		

Table 9-11. Troubleshooting (ARINC Functional Test) using Test Set Controller/Monitor

TROUBLE	PROBABLE CAUSE	REMEDY
9-38. Step 3 Failed indication is displayed.	See below.	Isolate by performing ARINC functional test (paragraph 9-44).
9-44. Step 7 ARINC and concentrator readings do not agree.	Controller/monitor assembly.	Isolate by performing steps below.
1. If ARINC and concentrator readings do not agree return test set for maintenance.		
9-44. Step 9 Discrete warning light did not go off within 3 minutes.	Controller/monitor assembly.	Isolate by performing steps below.
1. If discrete warning light did not go off within 3 minutes: a. And test set UUT Oxygen Concentration indication is within limits, then return test set for maintenance. b. And test set UUT Oxygen Concentration indication is not within limits, then proceed to troubleshooting table 9-9.		
9-44. Step 9 ARINC indicates failure(s).	Controller/monitor assembly. PSA assembly.	Isolate by performing steps below.
1. If failure(s) are indicated by the ARINC after 3 minutes and all instrumentation is “OK”, return test set for maintenance. 2. If fault is still present, then proceed to troubleshooting table 9-9 and 9-10 for possible corrective action on the PSA assembly.		
9-44. Step 11 I-BIT not complete or ARINC indicates failure(s).	Controller/monitor assembly.	Isolate by performing steps below.
1. If I-BIT does not complete after 30 seconds, return test set for maintenance.		

Table 9-11. Troubleshooting (ARINC Functional Test) using Test Set Controller/Monitor (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
2. If fault is still present, then proceed to troubleshooting table 9-9 and 9-10 for possible corrective action on the PSA assembly.		
9-44. Step 13 M-BIT not complete or ARINC indicates failure(s).	Controller/monitor assembly.	Isolate by performing steps below.
1. If M-BIT does not complete after 5 minutes and 30 seconds, return test set for maintenance. 2. If fault is still present, then proceed to troubleshooting table 9-9 and 9-10 for possible corrective action on the PSA assembly.		
9-44. Step 15 STATUS WORD 2 box does not display [1] - 21 Low O_2 Press or OXYGEN OUTLET Pressure not between 19 and 23 psia.	Controller/monitor assembly.	Isolate by performing steps below.
1. STATUS WORD 2 box does not display [1] - 21 Low O_2 Press or OXYGEN OUTLET Pressure not between 19 and 23 psia, return test set for maintenance. 2. If fault is still present, then proceed to troubleshooting table 9-9 and 9-10 for possible corrective action on the PSA assembly.		

9-47. DISASSEMBLY.

9-48. Disassemble concentrator using index numbers assigned to figure referred to unless otherwise noted. Disassemble concentrator only as far as required to correct any malfunction.

WARNING

When working with oxygen equipment, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Oil or any material containing oil, even in minute quantity, in conjunction with high purity oxygen under pressure can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

CAUTION

All disassembly, inspection, repair, and assembly must be done on clean benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor, and ceiling should have a smooth finish and be painted with nonchalking paint which can be kept clean and dust free.

NOTE

It is desirable to keep all parts for each individual component separated. Make careful note of location and quantity of all parts. Plastic, partitioned boxes with covers or similar storage should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

The concentrator shall be in upright position for disassembly purposes. Upright position is defined as the concentrator assembly resting on a flat surface, with bottom side down. Nitrogen beds and accumulator are toward the bottom of the assembly. Facing the output end, the controller/monitor assembly is found on the left side of output end. Oxygen Bed No. 1 is on top right side and nitrogen Bed No. 1 is on bottom right. Oxygen Bed No. 2 (top) and nitrogen Bed No. 2 (bottom) are on the left side. Front of unit is to the right of the output end, facing the side of the right-hand beds.

All preformed packings removed during removal and disassembly procedures shall be discarded. Replace with new preformed packing during assembly and installation procedures.

9-49. CONTROLLER/MONITOR ASSEMBLY REMOVAL. To remove the controller/monitor assembly (1, figure 9-10), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Plastic Bag	MIL-B-117
As Required	Rubber Band	ZZ-A-1415
As Required	Protective Cap Plug	NAS837-24
As Required	Duct Tape	A-A-2231

NOTE

Index numbers refer for figure 9-10 unless otherwise specified.

1. Ensure concentrator is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove socket head capscrew (3), flat washer (4), and lockwasher (5). Move grounding strap assembly (6), and replace socket head capscrew (3), lockwasher (5), and flat washer (4).

3. Remove tube fitting disc assembly (7) from back of the controller/monitor assembly (1) by loosening captive screw (8) to move tube fitting disc assembly (7) away from controller/monitor assembly (1), then pull tube fitting disc assembly (7) back as necessary to disconnect from controller/monitor assembly (1). Place plastic bag over tube fitting disc assembly (7). Secure it with a rubber band.

4. Place protective cap plug over the tube fitting disc assembly (7) opening on back of the controller/monitor assembly (1) and secure with tape.

5. Rotate concentrator counterclockwise and place on its side. Loosen four front-accessible captive socket head mounting screws (9) until socket head mounting screws (9) disengage from bed outlet structure assembly (11).

CAUTION

Loosening of captive socket head mounting screw (10) on back of bed outlet structure assembly (11) will cause the controller/monitor assembly (1) to become free. Controller/monitor assembly (1) will need to be supported during removal.

6. Rotate concentrator clockwise to lay it flat on the surface. Loosen remaining captive socket head mounting screw (10) from back of the bed outlet structure assembly (11) near top of controller/monitor assembly (1) until socket head mounting screw (10) disengages from bed outlet structure assembly (11).

9-50. OXYGEN CHECK VALVES (CV1 AND CV2) REMOVAL. To remove the oxygen check valves, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Protective Cap Plugs	NAS834-53

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure concentrator is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove controller/monitor assembly, refer to Controller/Monitor Assembly Removal (paragraph 9-49).

3. Loosen coupling nut (19) on the left oxygen tube (18) and coupling nut (26) on the right oxygen tube (25) at plenum assembly (ACC1) (2) FLTR3 and FLTR4 inlets.

4. Remove four socket head capscrews (22), lockwashers (23), and flat washers (24) from the left outlet fitting (32) of left oxygen bed assembly (6).

CAUTION

Removal of the outlet fitting (32) from the left oxygen bed assembly (6) will cause check valve (CV1) (41) to become free. Check valve (CV1) (41) may fall out during this operation.

5. Remove the left oxygen tube (18) and outlet fitting (32) from the left oxygen bed assembly (6), then remove check valve (CV1) (41) with preformed packing (42).

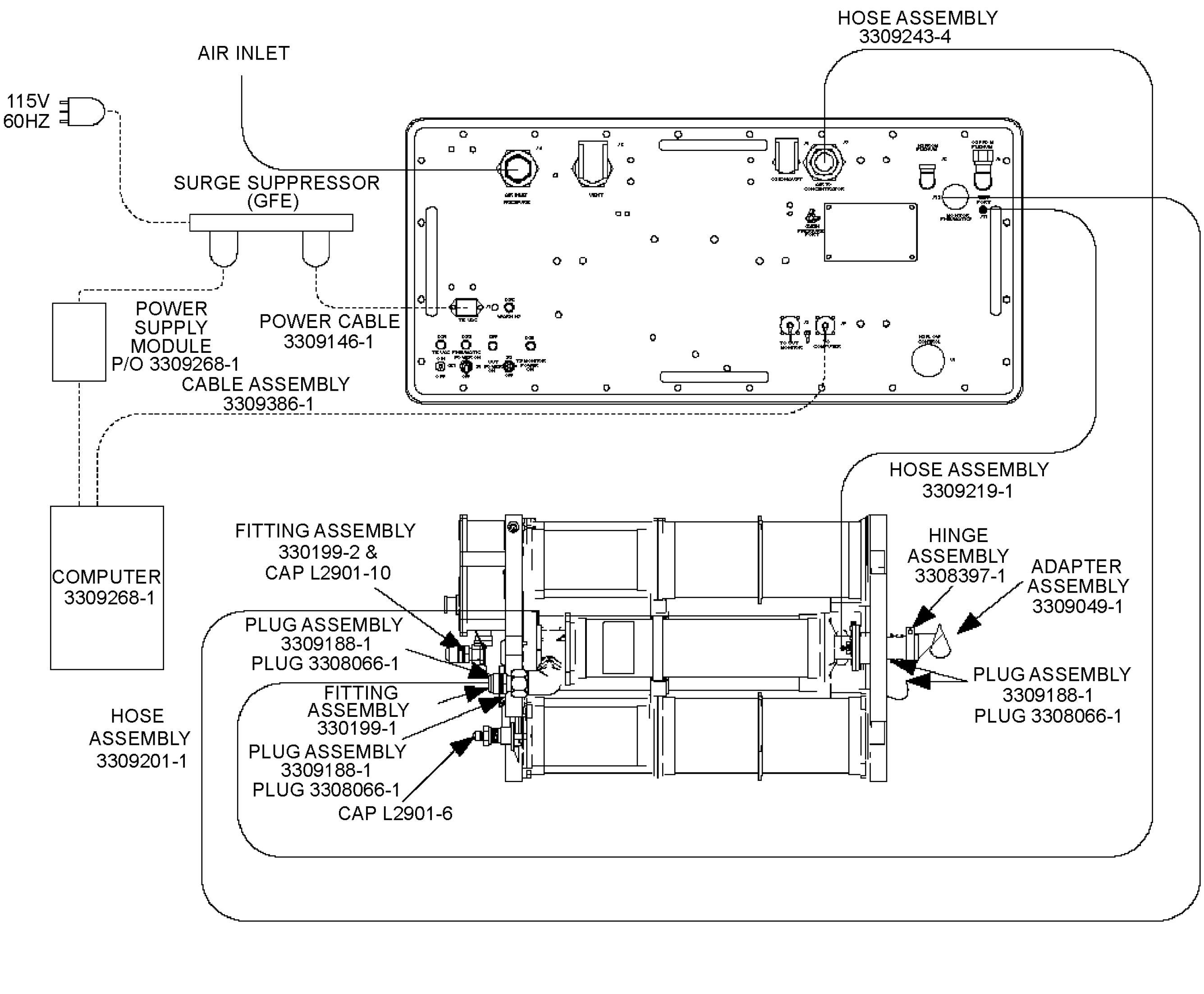
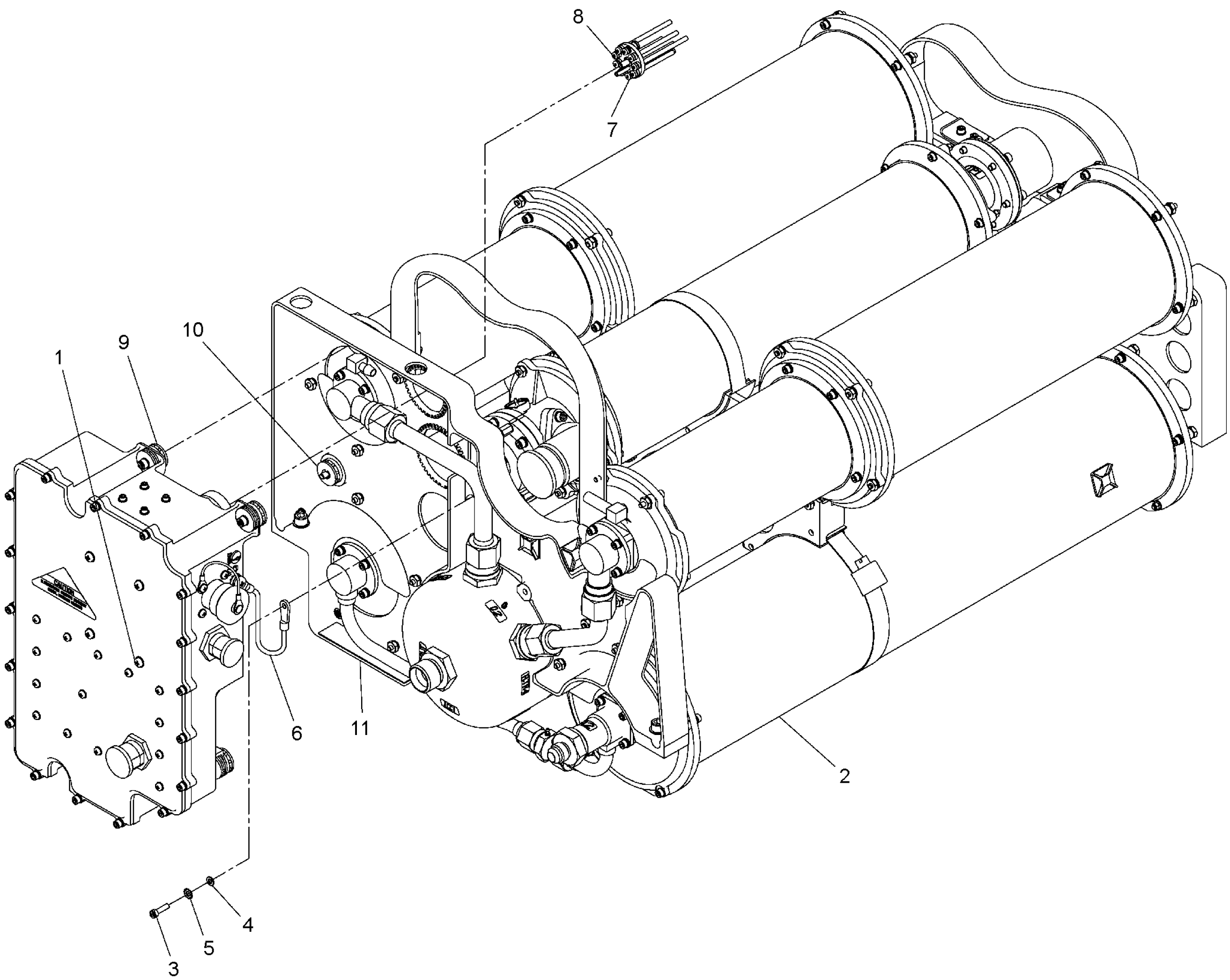


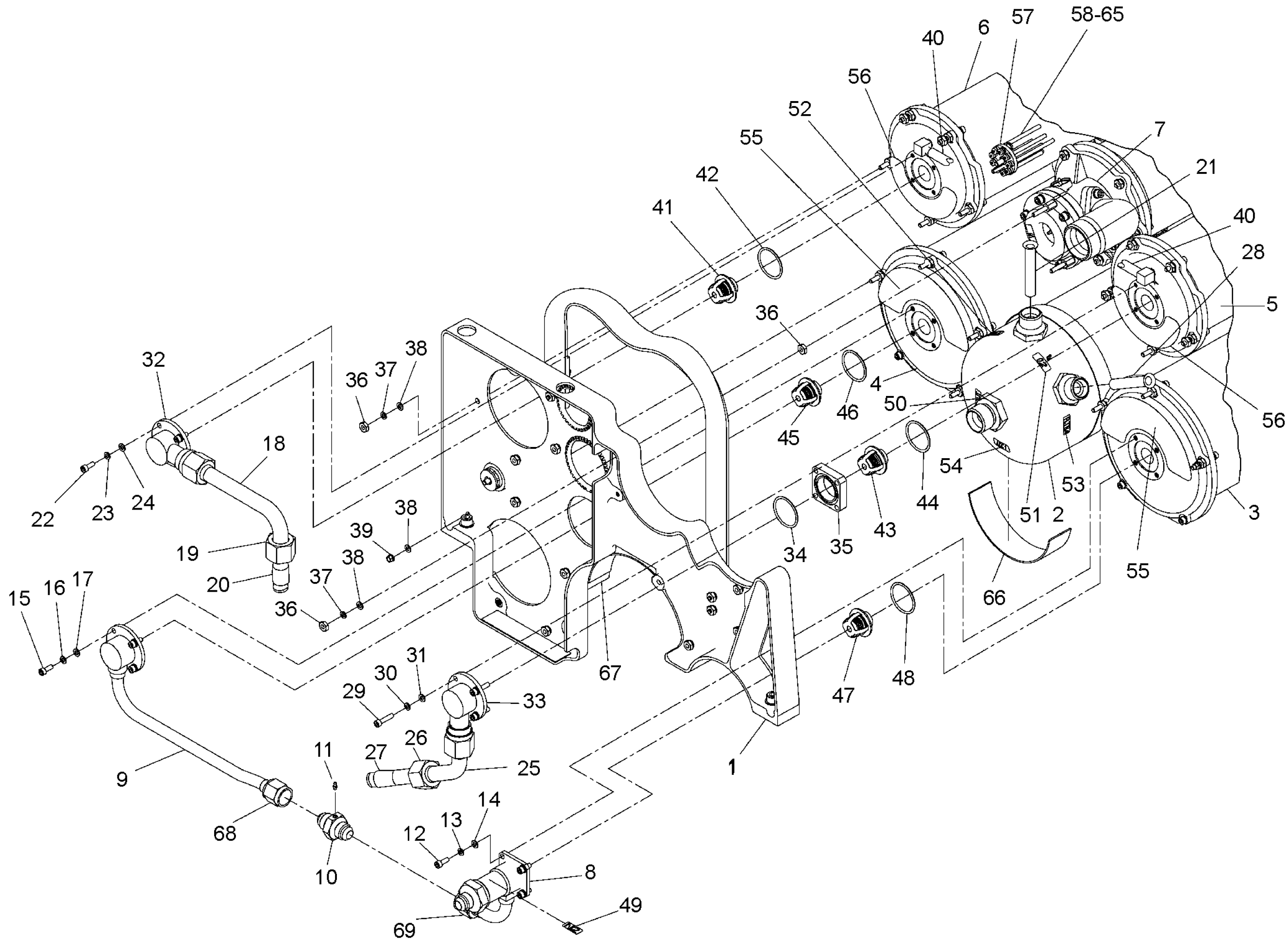
Figure 9-9. O_2N_2 Concentrator Performance Test Setup Using Test Set Controller/Monitor Only (Leakage Test)



1. CONTROLLER/MONITOR ASSEMBLY
2. PSA (PRESSURE SWING ADSORPTION) ASSEMBLY
3. SOCKET HEAD CAPSCREW
4. FLAT WASHER
5. LOCKWASHER
6. GROUNDING STRAP ASSEMBLY
7. TUBE FITTINGS DISC ASSEMBLY
8. CAPTIVE SCREW
9. CAPTIVE SOCKET HEAD MOUNTING SCREW (4)
10. CAPTIVE SOCKET HEAD MOUNTING SCREW (1)
11. BED OUTLET STRUCTURE ASSEMBLY

009010

Figure 9-10. O_2N_2 Concentrator, Type GGU-xx/A (Product Output End) Removal/Assembly



1. BED OUTLET STRUCTURE ASSY
2. PLENUM ASSEMBLY (ACC1)
3. NITROGEN BED ASSEMBLY (RIGHT)
4. NITROGEN BED ASSEMBLY (LEFT)
5. OXYGEN BED ASSEMBLY (RIGHT)
6. OXYGEN BED ASSEMBLY (LEFT)
7. SHUTOFF/FILTER/REGULATOR
8. CHECK VALVE ASSEMBLY (CV5)
9. COVER AND TUBE
10. TAPPED NIPPLE
11. TUBE FITTING
12. SOCKET HEAD CAPSCREW
13. LOCKWASHER
14. FLAT WASHER
15. SOCKET HEAD CAPSCREW
16. LOCKWASHER
17. FLAT WASHER
18. OXYGEN TUBE (LEFT)
19. FLARELESS SLEEVE COUPLING NUT
20. FLARELESS SLEEVE COUPLING
21. FLARELESS FILTER ELEMENT
22. SOCKET HEAD CAPSCREW
23. LOCKWASHER
24. FLAT WASHER
25. OXYGEN TUBE (RIGHT)
26. FLARELESS SLEEVE COUPLING NUT
27. FLARELESS SLEEVE COUPLING
28. FLARELESS FILTER ELEMENT
29. SOCKET HEAD CAPSCREW
30. LOCKWASHER
31. FLAT WASHER
32. OUTLET FITTING
33. OUTLET FITTING
34. PREFORMED PACKING
35. SPACER
36. PLAIN HEX NUT
37. LOCKWASHER
38. FLAT WASHER
39. SELF-LOCKING NUT
40. PLASTIC TUBING
41. CHECK VALVE (CV1)
42. PREFORMED PACKING
43. CHECK VALVE (CV2)
44. PREFORMED PACKING
45. CHECK VALVE (CV3)
46. PREFORMED PACKING
47. CHECK VALVE (CV4)
48. PREFORMED PACKING
49. IDENTIFICATION MARKER N_2
50. IDENTIFICATION MARKER O_2 OUT
51. IDENTIFICATION MARKER O_2
52. IDENTIFICATION MARKER FTLR3
53. IDENTIFICATION MARKER FLTR4
54. IDENTIFICATION MARKER ACC1
55. IDENTIFICATION MARKER WARNING
56. IDENTIFICATION MARKER WARNING
57. DISC ASSEMBLY
58. LABELED PLASTIC TUBING IN
59. LABELED PLASTIC TUBING N_2
60. LABELED PLASTIC TUBING O_2
61. LABELED PLASTIC TUBING V1
62. LABELED PLASTIC TUBING V2
63. LABELED PLASTIC TUBING V2
64. LABELED PLASTIC TUBING REG
65. LABELED PLASTIC TUBING EXH
66. DAMPING PAD
67. PLENUM RETAINER FLANGE
68. COUPLING NUT
69. COUPLING NUT

009011

Figure 9-11. O_2N_2 Concentrator, TYPE GGU-xx/A Removal/Assembly (Product Output End)

6. Remove four socket head capscrews (29), lockwashers (30), and flat washers (31) from the right outlet fitting (33) of right oxygen bed assembly (5).

CAUTION

Removal of the outlet fitting (33) and spacer (35) from the right oxygen bed assembly (5) will cause check valve (CV2) (43) to become free. Check valve (CV2) (43) may fall out during this operation.

7. Remove right oxygen tube (25), outlet fitting (33) with spacer (35), and preformed packing (34) from the right oxygen bed assembly (5), then remove check valve (CV2) (43) with preformed packing (44).

8. Place protective cap plugs (NAS834-53) in the oxygen bed (5 and 6) outlets.

9-51. NITROGEN CHECK VALVES (CV3, CV4 AND CV5) REMOVAL. To remove nitrogen check valves (CV3, CV4, and CV5), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Protective Cap Plugs	NAS834-53

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove controller/monitor assembly, refer to Controller/Monitor Assembly Removal (paragraph 9-49).

CAUTION

When loosening coupling nut (68) on cover and tube (9) and coupling nut (69) on check valve assembly (CV5) (8) connected to tapped nipple (10), be careful not to damage tube fitting (11) on tapped nipple (10).

3. Loosen coupling nut (68) on cover and tube (9) and coupling nut (69) on check valve assembly (CV5) (8) connected to tapped nipple (10) below plenum assembly (ACC1) (2).

4. Remove four socket head capscrews (15), lockwashers (16), and flat washers (17) from the cover and tube (9) of the left nitrogen bed assembly (4).

5. Remove four socket head capscrews (12), lockwashers (13), and flat washers (14) from check valve assembly (CV5) (8) of the right nitrogen bed assembly (3).

CAUTION

Removal of cover and tube (9) from left nitrogen bed assembly (4) will cause check valve (CV3) (45) to become free. Check valve (CV3) (45) may fall out during this operation.

6. Remove cover and tube (9), then remove check valve (CV3) (45) with preformed packing (46).

CAUTION

Removal of check valve assembly (CV5) (8) from right nitrogen bed assembly (3) will cause check valve (CV4) (47) to become free. Check valve (CV4) (47) may fall out during this operation.

7. Remove check valve assembly (CV5) (8), then remove check valves (CV4) (47) with preformed packing (48).

8. Place protective cap plugs (NAS834-53) in the nitrogen bed (3 and 4) outlets.

9-52. PLENUM ASSEMBLY (ACC1) REMOVAL. To remove plenum assembly (ACC1), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Protective Cap Plug	NAS844-2
As Required	Protective Cap Plug	NAS834-72

NOTE

Index numbers refer to figure 9-11 unless otherwise specified.

1. Ensure PSA assembly is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove controller/monitor assembly, refer to Controller/Monitor Assembly Removal (paragraph 9-49).

3. Remove oxygen check valves (CV1 and CV2), refer to Oxygen Check Valves (CV1 and CV2) Removal (paragraph 9-50).

4. Place protective cap plugs (NAS834-72) on the plenum assembly (ACC1) FLTR3 and FLTR4 inlets.

5. Remove nitrogen check valves (CV3 and CV4), refer to Nitrogen Check Valves (CV3, CV4 and CV5) Removal (paragraph 9-51).

WARNING

Because nonmetallic tubing and plenum assembly (ACC1) (2) are in the oxygen flow path, openings must be sealed to maintain oxygen clean requirement when tubing is disconnected.

6. Remove labeled plastic tubing O_2 (60) from oxygen output port labeled with identification marker O_2 (51) on plenum assembly (ACC1) (2) and place protective cap plug (NAS844-2) on the oxygen output port.

7. Place PSA assembly (2, figure 9-10) on its side for access to the support stud on the closed end of plenum assembly (ACC1) (1, figure 9-12) and clamping screws on the band clamps (7, figure 9-13).

8. Remove plain hex nut (8, figure 9-12), lockwasher (9, figure 9-12), and flat washer (10, figure 9-12) securing the support stud on the closed end of plenum assembly (ACC1) (1, figure 9-12) to plenum mount bracket (47, figure 9-12).

9. Loosen clamping screw on band clamps (7, figure 9-13) near the center and outlet end of plenum assembly (ACC1) (2, figure 9-13). The band clamps (7, figure 9-13) should be loose enough to slide freely over the plenum assembly (ACC1) (2, figure 9-13).

10. Slowly pull plenum assembly (ACC1) (2, figure 9-13) with damping pad (66) toward output end and out of the PSA assembly. If clamps (7, figure 9-13) bind, wiggle them into a nonbinding position or loosen them further to allow the tube to slide freely through the clamps.

11. If necessary, peel off sticky-backed damping pad (66) from plenum assembly (ACC1) (2).

9-53. SHUTOFF VALVE/FILTER/REGULATOR (REDUCER) ASSEMBLIES (V1/FLTR1/REG1) REMOVAL. To remove the shutoff valve/filter/regulator assemblies (V1/FLTR1/REG1), proceed as follows:

NOTE

Index numbers refer to figure 9-11 unless otherwise specified.

1. Ensure PSA assembly is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove two nuts (36), lockwashers (37), and flat washers (38) holding shutoff valve/filter/regulator assembly (7) to the bed outlet structure assembly (1).

3. Open the band clamp (9, figure 9-13) holding the shutoff valve/filter/regulator assembly (7) to the center structure assembly (5, figure 9-13). The band clamp (9, figure 9-13) should be loose enough to slide freely over the shutoff valve/filter/regulator assembly (7).

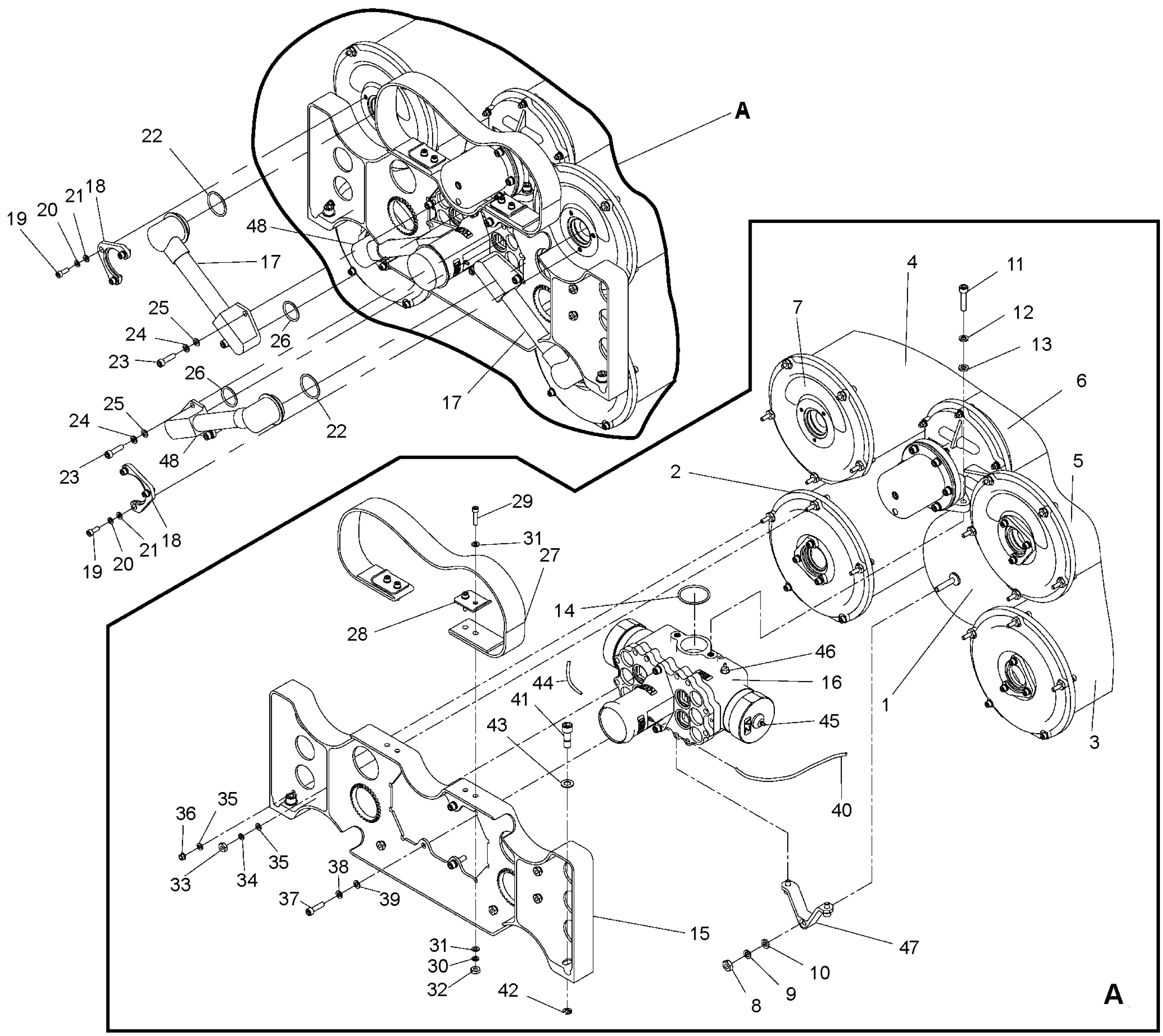
4. Remove two socket head capscrews (11, figure 9-12), lockwashers (12, figure 9-12), and flat washers (13, figure 9-12) holding the shutoff valve/filter/regulator assembly (6, figure 9-12) to the slide valve assembly (16, figure 9-12).

5. Lift the outlet end of the shutoff valve/filter/regulator assembly (6, figure 9-12) up and remove preformed packing (14, figure 9-12), then slide shutoff valve/filter/regulator assembly (7) back to clear the jack studs (9, figure 9-14) on inlet end of the shutoff valve/filter/regulator assembly (7).

6. Remove labeled plastic tubing V1 (61) from the tube fitting (13, figure 9-15) at the port labeled with identification marker V1 (17, figure 9-15) on the output end of the shutoff valve/filter/regulator assembly (7), then remove IN tubing (58) from tube fitting (14, figure 9-15).

7. Remove labeled plastic tubing DRAIN (40, figure 9-12) from the tube fitting (12, figure 9-14) on the bottom of the shutoff valve/filter/regulator assembly.

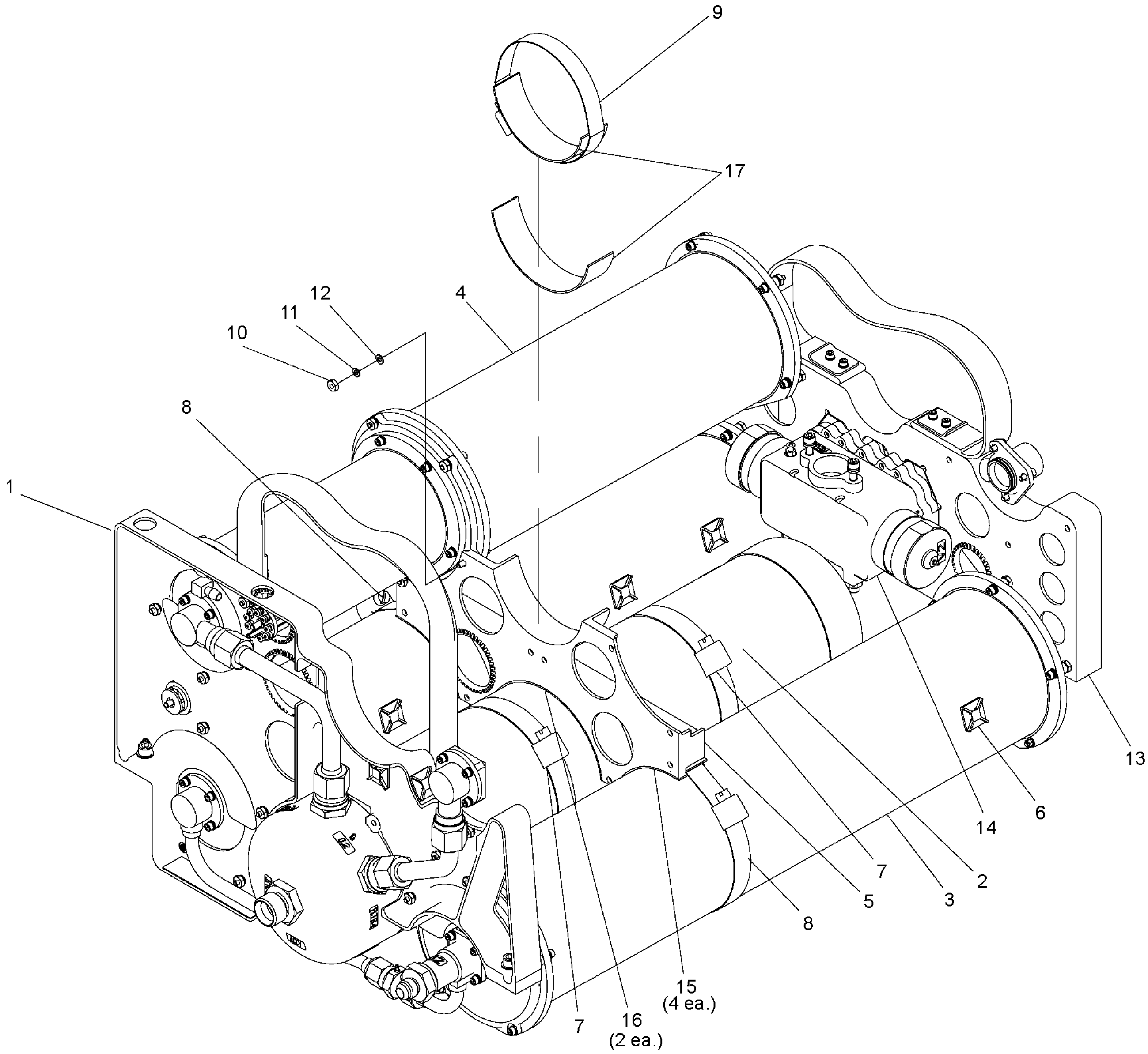
8. Seal off the slide valve assembly (16, figure 9-12) inlet hole with tape or a protective plug.



1. PLENUM ASSEMBLY (ACC1)
2. NITROGEN BED ASSEMBLY (RIGHT)
3. NITROGEN BED ASSEMBLY (LEFT)
4. OXYGEN BED ASSEMBLY (RIGHT)
5. OXYGEN BED ASSEMBLY (LEFT)
6. SHUTOFF/FILTER/REGULATOR
7. IDENTIFICATION MARKER WARNING
8. PLAIN HEX NUT (3/8″)
9. LOCKWASHER
10. FLAT WASHER
11. SOCKET HEAD CAPSCREW
12. LOCKWASHER
13. FLAT WASHER
14. PREFORMED PACKING
15. BED INLET STRUCTURE ASSEMBLY
16. SLIDE VALVE ASSEMBLY
17. ELBOW AND TUBE ASSEMBLY
18. ELBOW RETAINER
19. SOCKET HEAD CAPSCREW
20. LOCKWASHER
21. FLAT WASHER
22. PREFORMED PACKING
23. SOCKET HEAD CAPSCREW
24. LOCKWASHER
25. FLAT WASHER
26. PREFORMED PACKING
27. LIFTING STRAP
28. STRAP PLATE
29. SOCKET HEAD CAPSCREW
30. LOCKWASHER
31. FLAT WASHER
32. PLAIN HEX NUT
33. PLAIN HEX NUT
34. LOCKWASHER
35. FLAT WASHER
36. SELF-LOCKING NUT
37. SOCKET HEAD CAPSCREW
38. LOCKWASHER
39. FLAT WASHER
40. LABELED PLASTIC TUBING DRAIN
41. CAPTIVE SCREW
42. EXTERNAL RETAINING RING
43. FLAT WASHER
44. LABELED PLASTIC TUBING EXH
45. V2 PORT (2)
46. REG PORT
47. PLENUM MOUNT BRACKET
48. ELBOW AND TUBE ASSEMBLY

009012

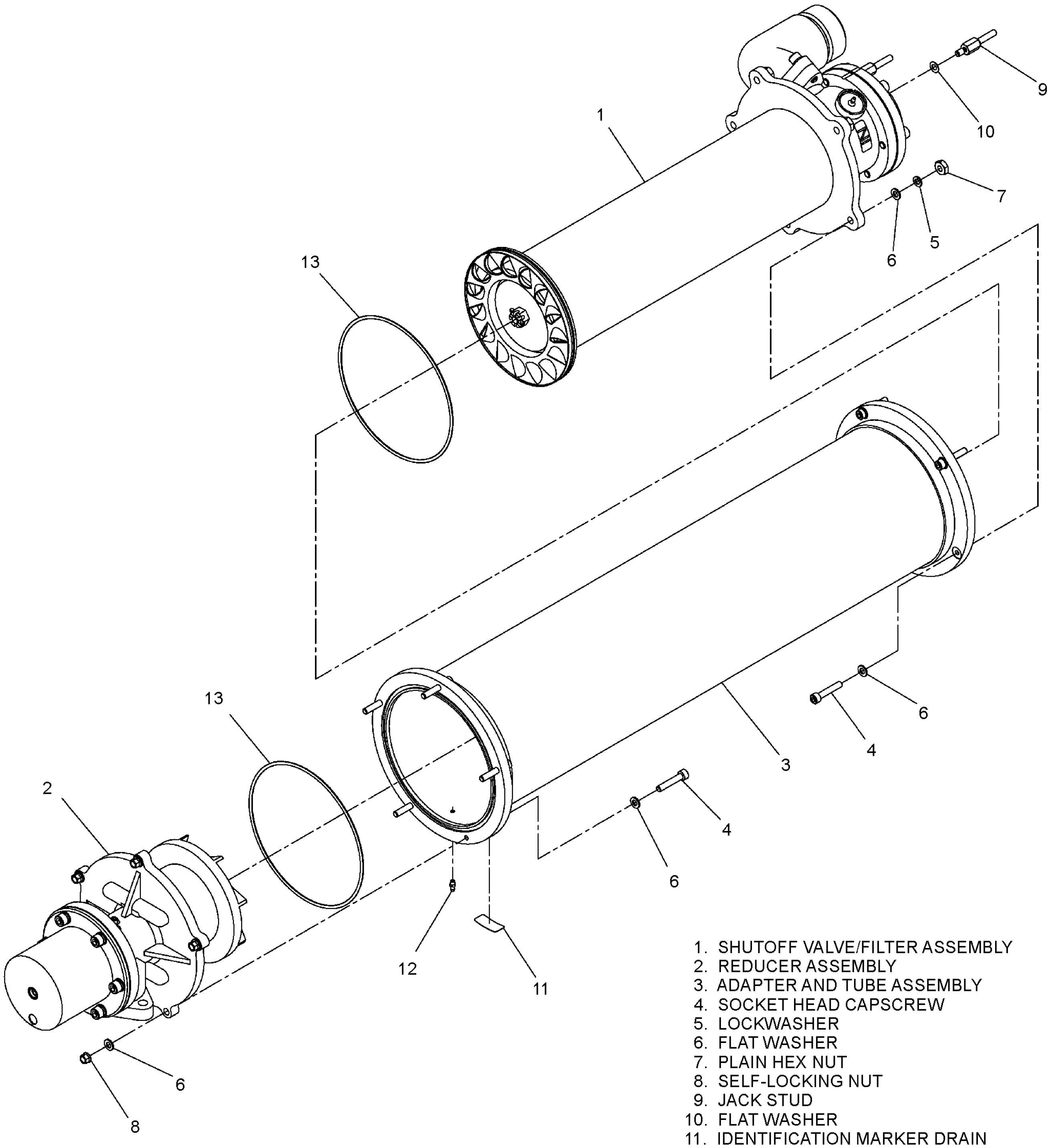
Figure 9-12. O_2N_2 Concentrator, TYPE GGU-xx/A Removal/Assembly (Exhaust End)



1. BED OUTLET STRUCTURE ASSEMBLY
2. PLENUM ASSEMBLY
3. NITROGEN BED ASSEMBLY (RIGHT)
4. OXYGEN BED ASSEMBLY (LEFT)
5. CENTER STRUCTURE ASSEMBLY
6. ELECTRICAL TIEDOWN CLEAT
7. BAND CLAMP (PLENUM ASSEMBLY)
8. BAND CLAMP (N_2 BED ASSEMBLY)
9. BAND CLAMP (SHUTOFF/FILTER/REGULATOR ASSEMBLY)
10. PLAIN HEX NUT
11. LOCKWASHER
12. FLAT WASHER
13. BED INLET STRUCTURE ASSEMBLY
14. SLIDE VALVE ASSEMBLY
15. DAMPING PAD (3.5″) 4 EACH
16. DAMPING PAD (6.5″) 2 EACH
17. DAMPING PAD (5.5″) 2 EACH

009013

Figure 9-13. O_2N_2 Concentrator, TYPE GGU-xx/A Removal/Assembly (Center Section, with Shutoff Valve/Filter/Regulator and Right O_2 Bed Removed)



1. SHUTOFF VALVE/FILTER ASSEMBLY
2. REDUCER ASSEMBLY
3. ADAPTER AND TUBE ASSEMBLY
4. SOCKET HEAD CAPSCREW
5. LOCKWASHER
6. FLAT WASHER
7. PLAIN HEX NUT
8. SELF-LOCKING NUT
9. JACK STUD
10. FLAT WASHER
11. IDENTIFICATION MARKER DRAIN
12. TUBE FITTING
13. PREFORMED PACKING

009014

Figure 9-14. Shutoff Valve, Filter and Regulator Assembly, P/N 1653720-1 Removal/Assembly

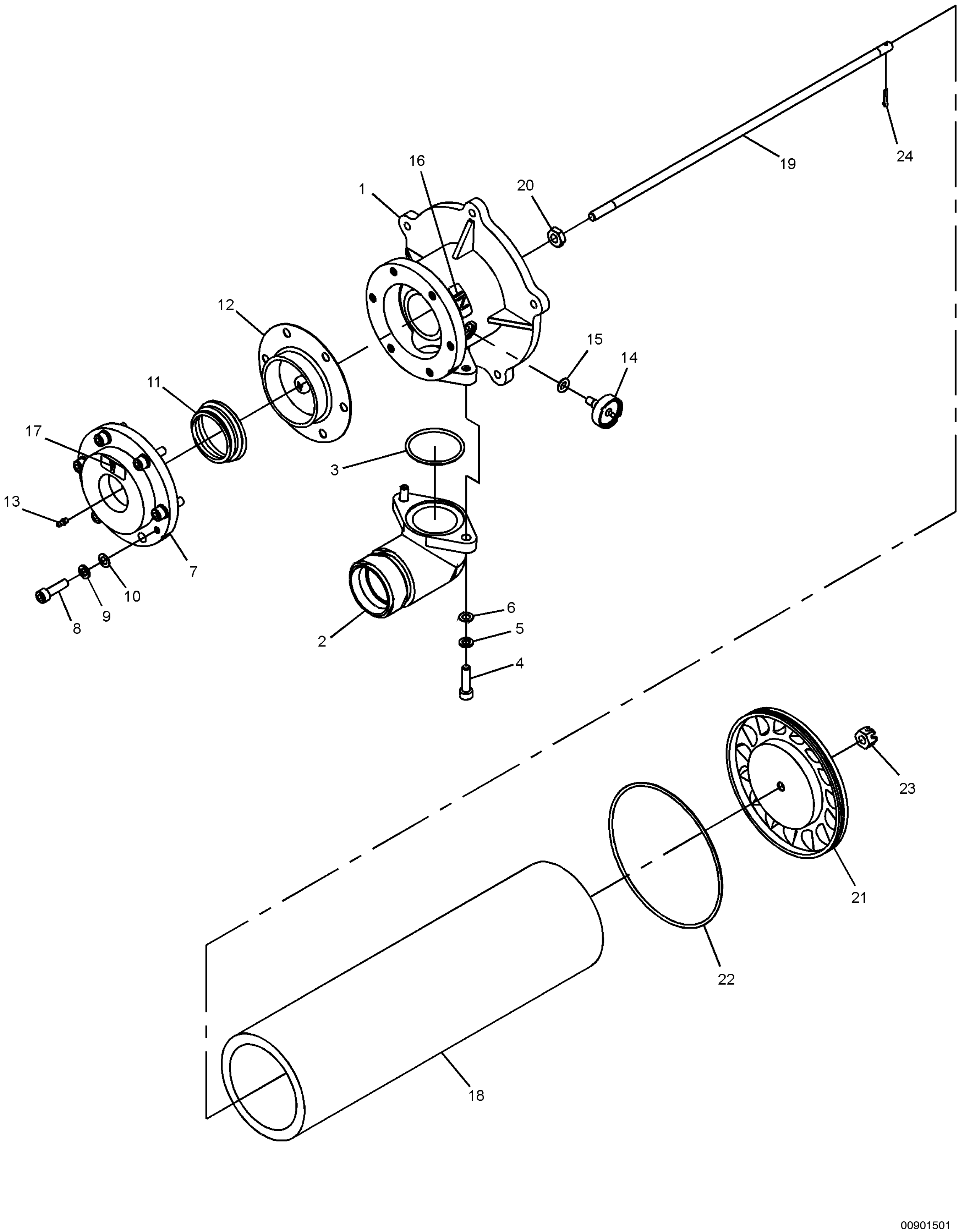


Figure 9-15. Shutoff Valve and Filter Assembly, P/N 1653695-1 Removal/Assembly (Sheet 1 of 2)

1.	SHUTOFF VALVE BASE	13.	TUBE FITTING
2.	INLET UNIT ELBOW	14.	FILTER ASSEMBLY
3.	PREFORMED PACKING	15.	PREFORMED PACKING
4.	SOCKET HEAD CAPSCREW	16.	IDENTIFICATION MARKER IN
5.	LOCKWASHER	17.	IDENTIFICATION MARKER V1
6.	FLAT WASHER	18.	FILTER ELEMENT
7.	SHUTOFF CAP	19.	FILTER ROD
8.	SOCKET HEAD CAPSCREW	20.	PLAIN HEX NUT
9.	LOCKWASHER	21.	SWIRLER
10.	FLAT WASHER	22.	PREFORMED PACKING
11.	CONICAL SPRING	23.	CASTELLATED PLAIN NUT
12.	SHUTOFF DIAPHRAGM ASSEMBLY	24.	COTTER PIN

Figure 9-15. Shutoff Valve and Filter Assembly, P/N 1653695-1 Removal/Assembly (Sheet 2 of 2)

9-54. SHUTOFF VALVE/FILTER ASSEMBLY (V1/FLTR1) DISASSEMBLY. To disassemble the shutoff valve/filter assembly (V1/FLTR1) (1, figure 9-14), proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Spanner Socket Wrench	3309452-1

NOTE

Index numbers refer to figure 9-14 unless otherwise noted.

For removal of inlet filter (18, figure 9-15) only refer to steps 1 and 3 through 6.

1. Remove shutoff valve/filter/regulator (reducer) assemblies (V1/FLTR1/REG1), refer to Shutoff Valve/ Filter/Regulator (Reducer) Assemblies (V1/FLTR1/ REG1) Removal (paragraph 9-53).

2. Remove two jack studs (9) and flat washers (10) from the shutoff valve/filter/regulator (7, figure 9-11).

3. For ease of assembly and using an indelible marker or equivalent, mark connection between shutoff valve/filter assembly (1) and adapter and tube assembly (3) prior to disassembly.

4. Remove five plain hex nuts (7), lockwashers (5), and flat washers (6) coupling the shutoff valve and filter assembly (1) to the adapter and tube assembly (3). Leave five socket head capscrews (4) with flat washers (6) attached to the adapter and tube assembly (3).

5. Remove the shutoff valve and filter assembly (1) and preformed packing (13) from the adapter and tube assembly (3).

6. Remove the filter element (18, figure 9-15) from the shutoff valve and filter assembly (1) by removing cotter pin (24, figure 9-15) and plain castellated nut (23, figure 9-15) at the end of the filter rod (19, figure 9-15), then remove the swirler (21, figure 9-15), preformed packing (22, figure 9-15), and filter element (18, figure 9-15) from the shutoff valve and filter assembly (1).

7. Using spanner socket wrench loosen and remove filter assembly (14, figure 9-15) and preformed packing (15, figure 9-15) at port labeled with identification marker IN (16, figure 9-15) by unscrewing filter assembly (14, figure 9-15) from shutoff valve base (1, figure 9-15).

8. Remove the shutoff diaphragm assembly (12, figure 9-15) by removing six socket head capscrews (8, figure 9-15), lockwashers (9, figure 9-15), and flat washers (10, figure 9-15), then remove shutoff cap (7, figure 9-15) with tube fitting (13, figure 9-15), conical spring (11, figure 9-15), and shutoff diaphragm assembly (12, figure 9-15).

9. Remove the inlet unit elbow (2, figure 9-15) and preformed packing (3, figure 9-15) by removing two socket head cap-screws (4, figure 9-15), lockwashers (5, figure 9-15), and flat washers (6, figure 9-15).

9-55. REDUCER ASSEMBLY (REG1) DISASSEMBLY. To disassemble the reducer assembly (REG1) (2, figure 9-14), proceed as follows:

1. Remove shutoff valve/filter/regulator (reducer) assemblies (V1/FLTR1/REG1), refer to Shutoff Valve/ Filter/Regulator (Reducer) Assemblies (V1/FLTR1/ REG1) Removal (paragraph 9-53).

2. For ease of assembly and using an indelible marker or equivalent, mark connection between reducer assembly (2, figure 9-14) and adapter and tube assembly (3, figure 9-14) prior to disassembly.

3. Remove five self-locking nuts (8, figure 9-14) and flat washers (6, figure 9-14) coupling the reducer assembly (2, figure 9-14) to the adapter and tube assembly (3, figure 9-14). Leave five socket head capscrews (4, figure 9-14) with flat washers (6, figure 9-14) attached to the adapter and tube assembly (3, figure 9-14).

4. Remove the reducer assembly (2, figure 9-14) with preformed packing (13, figure 9-14) from the adapter and tube assembly (3, figure 9-14).

5. Remove four socket head capscrews (10, figure 9-16), lockwashers (11, figure 9-16), and flat washers (12, figure 9-16), then slide deswirler (9, figure 9-16) away from regulator base (1, figure 9-16).

6. Remove regulator piston (6, figure 9-16) and preformed packing (7, figure 9-16) by removing plain hex nut (8, figure 9-16) from the regulator piston rod (1, figure 9-17) of the diaphragm assembly (5, figure 9-16).

7. Remove spring cover (13, figure 9-16) with setscrew (19, figure 9-16), spring retainer (18, figure 9-16), and spring (17, figure 9-16) by removing six socket head capscrews (14, figure 9-16), lockwashers (15, figure 9-16), and flat washers (16, figure 9-16) from the regulator base (1, figure 9-16).

8. Remove the diaphragm assembly (5, figure 9-16) with flanged bearing (4, figure 9-16) from the regulator base (1, figure 9-16) by sliding the regulator piston rod (1, figure 9-17) of the diaphragm assembly (5, figure 9-16) from the regulator base.

9. Disassemble the diaphragm assembly (5, figure 9-16) by removing the plain hex nut (7, figure 9-17), lockwasher (6, figure 9-17), and flat washer (5, figure 9-17) from the regulator piston rod (1, figure 9-17).

10. Remove the regulator piston rod (1, figure 9-17) from diaphragm piston (4, figure 9-17), rolling diaphragm (3, figure 9-17), and diaphragm retainer plate (2, figure 9-17).

9-56. BED OUTLET STRUCTURE ASSEMBLY REMOVAL. To remove the bed outlet structure assembly (1, figure 9-11), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Protective Cap Plug	NAS834-29

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove controller/monitor assembly, refer to Controller/Monitor Assembly Removal (paragraph 9-49).

3. Remove plastic tubing (40) between left oxygen bed assembly (6) and right oxygen bed assembly (5) on output end of the PSA assembly. Place protective cap plugs (NAS834-29) on the left and right oxygen bed assembly (6 and 5) outputs.

4. Remove labeled plastic tubing O_2 (60) from oxygen output port labeled with identification marker O_2 (51) on plenum assembly (ACC1) (2).

5. Remove labeled plastic tubing N_2 (59) attached to the tube fitting (11) attached to tapped nipple (10) on the output end of the PSA assembly.

6. Remove oxygen check valves (CV1 and CV2), refer to Oxygen Check Valves (CV1 and CV2) Removal (paragraph 9-50).

7. Remove nitrogen check valves (CV3, CV4, and CV5), refer to Nitrogen Check Valves (CV3, CV4 and CV5) Removal (paragraph 9-51).

8. Remove three plain hex nuts (36), lockwashers (37), and flat washers (38) from right oxygen bed assembly (5) on the output end of the PSA assembly (2, figure 9-10).

9. Remove five plain hex nuts (36), lockwashers (37), and flat washers (38) from the left oxygen bed assembly (6) on the output end of the PSA assembly (2, figure 9-10).

10. Remove two plain hex nuts (36), lockwashers (37), and flat washers (38), then remove one self-locking hex nut (39) with flat washer (38) from the right nitrogen bed assembly (3) on the output end of the PSA assembly (2, figure 9-10).

11. Remove three plain hex nuts (36), lockwashers (37), and flat washers (38), then remove one self-locking hex nut (39) with flat washer (38) from the left nitrogen bed assembly (4) on the output end of the PSA assembly (2, figure 9-10).

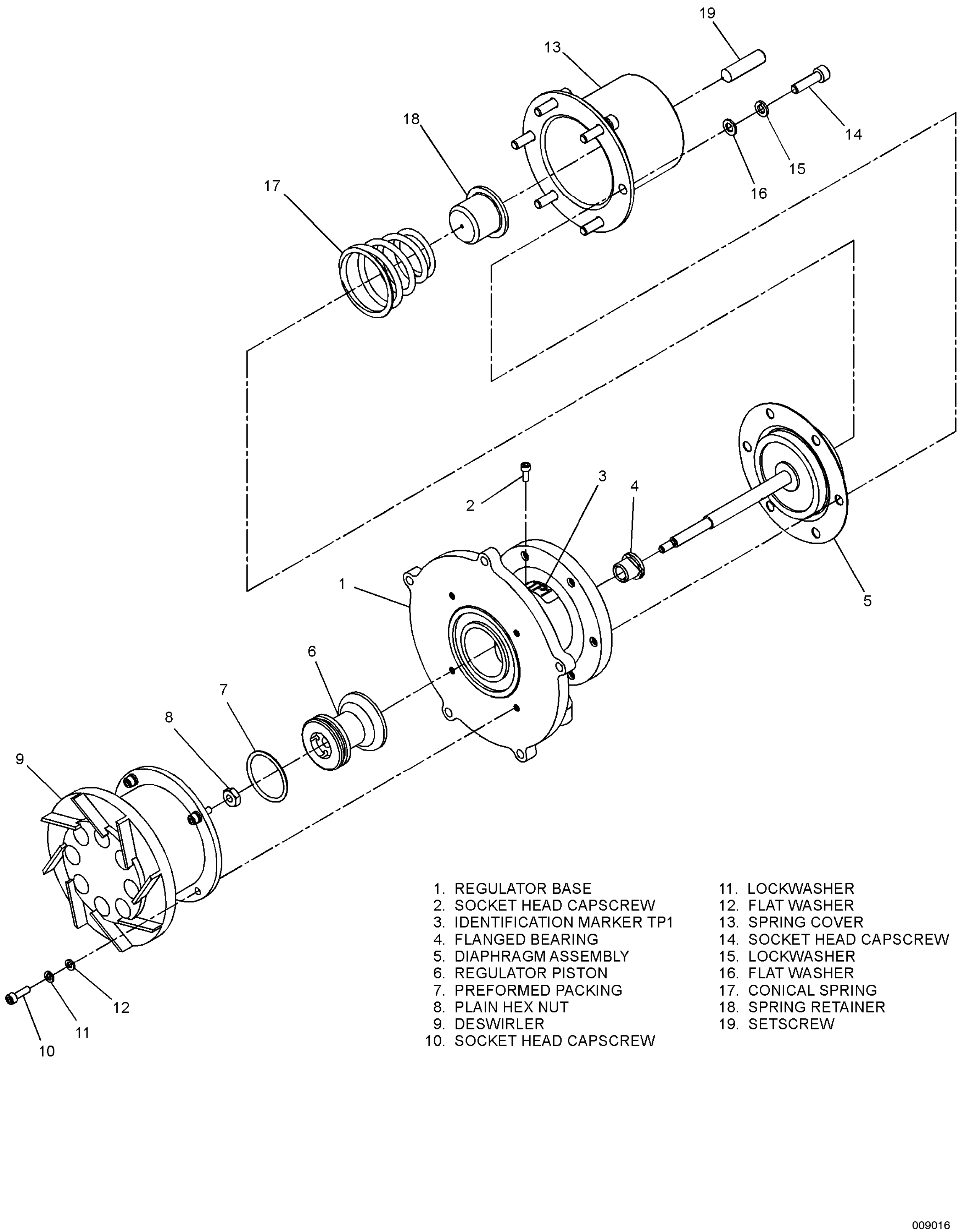


Figure 9-16. Reducer Assembly, P/N 1653696-1 Removal/Assembly

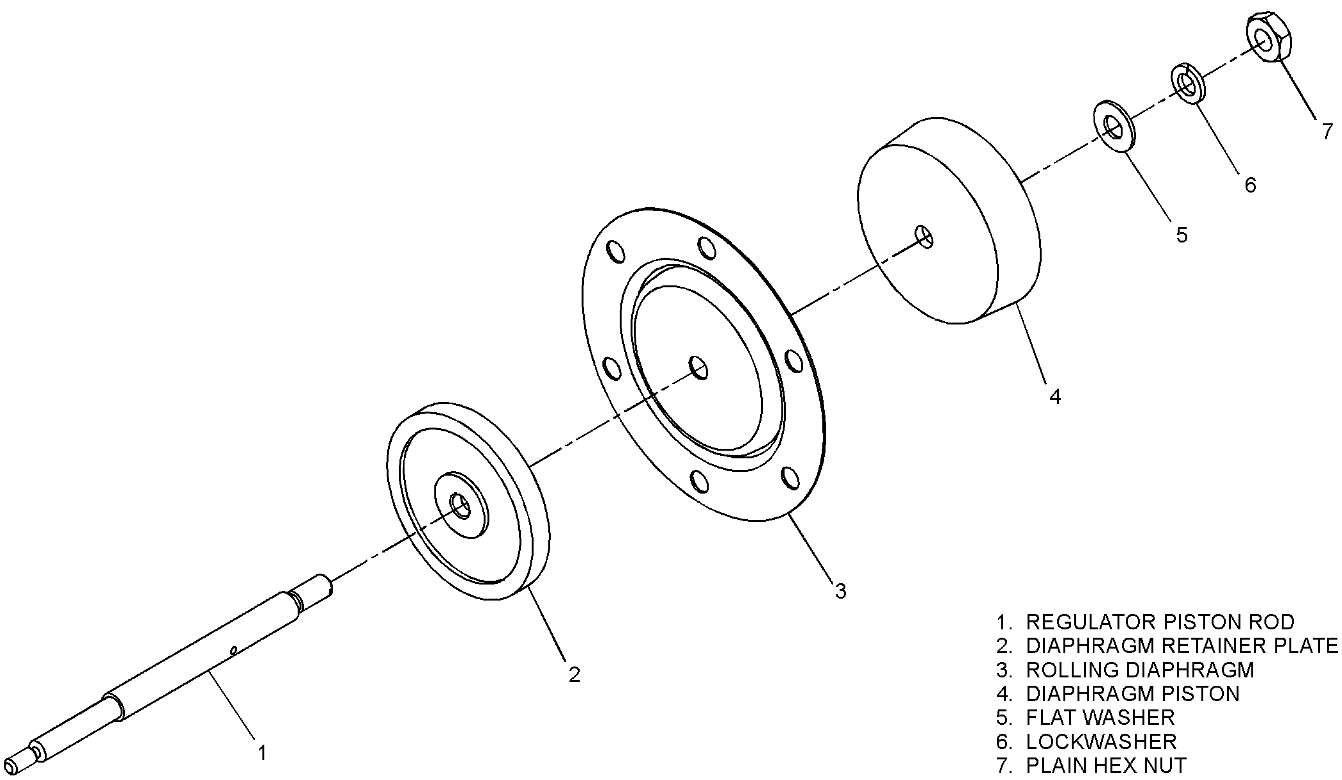


Figure 9-17. Regulator Diaphragm Assembly, P/N 1647152-1 Removal/Assembly

12. Remove two plain hex nuts (36), lockwashers (37), and flat washers (38) from the shutoff valve/filter/regulator assembly (7) on the output end of the PSA assembly (2, figure 9-10).

13. Remove band clamp (7, figure 9-13) from plenum retainer flange (67, figure 9-11) at output end of plenum assembly (ACC1) (2).

9-57. TUBE FITTINGS DISC ASSEMBLY REMOVAL. To remove the tube fittings disc assembly (7, figure 9-10), proceed as follows:

NOTE

Index numbers refer to figure 9-10 unless otherwise noted.

1. If not previously removed, remove tube fitting disc assembly (7) from back of the controller/monitor assembly (1) by loosening captive screw (8) to force tube fitting disc assembly (7) away from controller/monitor assembly (1), then pull tube fitting disc assembly (7) back as necessary to disconnect pneumatic lines from controller/monitor assembly (1).

2. Remove eight labeled plastic tubings (58 through 65, figure 9-11) by gently pulling from eight tube fitting barbs (8, figure 9-18). Inspect eight labeled plastic tubings (58 through 65, figure 9-11) for cracks or distortion and replace as required.

9-58. TUBE FITTINGS DISC ASSEMBLY DISASSEMBLY. To disassemble the tube fittings disc assembly (7, figure 9-10), proceed as follows:

NOTE

Index numbers refer to figure 9-18 unless otherwise noted.

1. Remove the external retainer ring (3) on the back side of the tube retainer disc (1), and remove captive screw (2) and flat washer (4) from tube retainer disc (1).

2. Remove the external retainer ring (9) on the front side of the tube retainer disc (1), and remove tube fitting barb (8) with preformed packing (10) from tube retainer disc (1).

3. Remove the external retainer ring (7) on the back side of the tube retainer disc (1), and remove vacuum fitting (5) with inlet filter (6) and preformed packing (12) from tube retainer disc (1).

4. If necessary, remove tubular spring pin (11) from tube retainer disc (1).

9-59. BED INLET STRUCTURE ASSEMBLY REMOVAL. To remove the bed inlet structure assembly (15, figure 9-12), proceed as follows:

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from the exhaust end.

2. Remove labeled plastic tubing EXH (44) and labeled plastic tubing DRAIN (40) at the exhaust port of the slide valve assembly (16).

3. Remove four socket head capscrews (37), lockwashers (38), and flat washers (39) securing slide valve assembly (16) to bed inlet structure assembly (15).

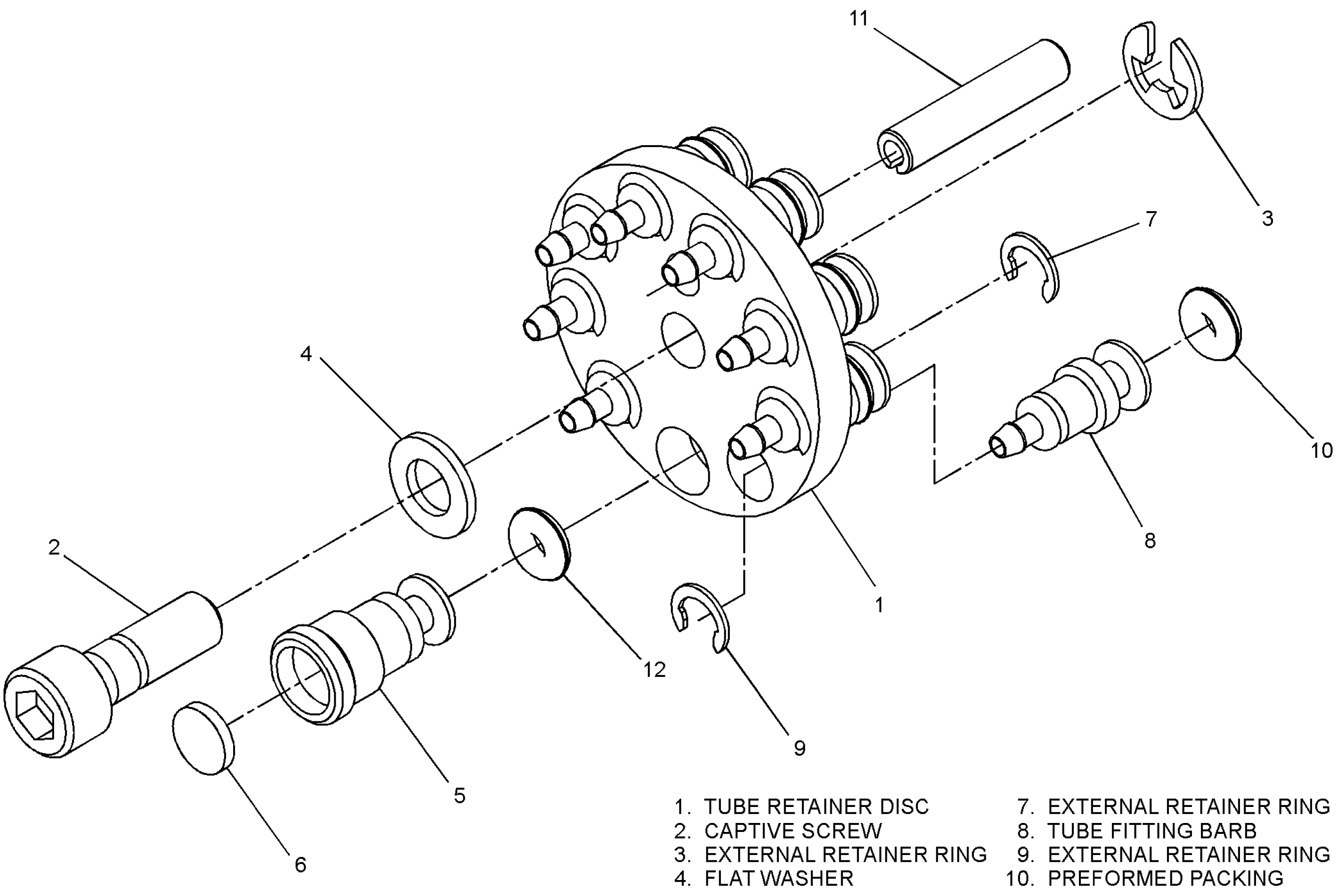
4. Remove two socket head capscrews (23), lockwashers (24), and flat washers (25) from each elbow and tube assembly (17) at the end attached to the slide valve (16).

5. Remove three socket head capscrews (19), lockwashers (20), flat washers (21), and elbow retainers (18) from each elbow and tube assembly (17) at the end attached to the oxygen bed assemblies (4 and 5) and nitrogen bed assemblies (2 and 3).

6. Remove four elbows and tube assemblies (17) with preformed packing (26) at the end attached to the slide valve (16), and preformed packing (22) at the end attached to the oxygen bed assemblies (4 and 5) and nitrogen bed assemblies (2 and 3).

7. Remove ten plain hex nuts (33), lockwashers (34), and flat washers (35). Remove two self-locking hex nuts (36) and flat washers (35) from nitrogen bed assemblies (2 and 3) and oxygen bed assemblies (4 and 5) on the exhaust end of the PSA assembly (2, figure 9-10).

8. If necessary, remove lifting strap (27) with strap plate (28) by removing four socket head capscrews (29), flat washers (31), lockwashers (30), flat washers (31), and plain hex nuts (32).



1. TUBE RETAINER DISC
2. CAPTIVE SCREW
3. EXTERNAL RETAINER RING
4. FLAT WASHER
5. VACUUM FITTING
6. INLET FILTER
7. EXTERNAL RETAINER RING
8. TUBE FITTING BARB
9. EXTERNAL RETAINER RING
10. PREFORMED PACKING
11. TUBULAR SPRING PIN
12. PREFORMED PACKING

009018

Figure 9-18. Tube Fittings Disc Assembly, P/N 1653870-1 Removal/Assembly

9. If necessary, remove two captive screws (41) and flat washers (43) by removing external retainer rings (42).

9-60. SLIDE VALVE ASSEMBLY (V2) REMOVAL. To remove slide valve assembly (16, figure 9-12), proceed as follows:

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from the exhaust end.

2. Remove the bed inlet structure assembly, refer to Bed Inlet Structure Assembly Removal (paragraph 9-59).

3. Remove labeled plastic tubings V2 (62 and 63, figure 9-11) and labeled plastic tubing REG (64, figure 9-11) from the slide valve at the ports with identification markers V2 and REG ports (45 and 46).

4. Place PSA assembly (2, figure 9-10) on its side to gain access to the plenum assembly (ACC1) (1).

5. Remove plain hex nut (8), lockwasher (9), and flat washer (10) from the support stud on the closed end of plenum assembly (ACC1) (1).

6. Place PSA assembly (2, figure 9-10) on a flat bench surface with bottom side down, then work from the exhaust end.

7. Remove two socket head capscrews (11), lockwashers (12), and flat washers (13) securing slide valve assembly (16) to shutoff/filter/regulator assembly (6).

8. Remove slide valve assembly (16) and preformed packing (14) from PSA assembly (2, figure 9-10).

9. Ensure that all open holes are covered with tape or protective cap plugs.

9-61. CENTER STRUCTURE ASSEMBLY AND OXYGEN/NITROGEN BED ASSEMBLIES REMOVAL. To remove center structure assembly (5, figure 9-13), left/right oxygen bed assemblies (4 and 5, figure 9-12) and left/right nitrogen bed assemblies (2 and 3, figure 9-12), proceed as follows:

WARNING

When working with oxygen equipment, make certain that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Oil, or any material containing oil, even in minute quantity, in conjunction with high purity oxygen under pressure can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from the exhaust end.

2. Remove controller/monitor assembly, refer to Controller/Monitor Assembly Removal (paragraph 9-49).

3. Remove plenum assembly (ACC1), refer to Plenum Assembly (ACC1) Removal (paragraph 9-52).

4. Remove the shutoff valve/filter/regulator assemblies (V1/FLTR1/REG1), refer to Shutoff Valve/Filter/Regulator Assemblies (V1/FLTR1/REG1) Removal (paragraph 9-53).

5. Remove plastic tubing, refer to Plastic Tubing Removal (paragraph 9-62).

6. Remove the bed outlet structure assembly, refer to Bed Outlet Structure Assembly Removal (paragraph 9-56).

7. Remove two band clamps (8, figure 9-13) from the left and right nitrogen bed assemblies (2 and 3, figure 9-12) on the center structure assembly (5).

8. Remove the bed inlet structure assembly, refer to Bed Inlet Structure Assembly Removal (paragraph 9-59).

9. Remove four plain hex nuts (10, figure 9-13), lockwashers (11, figure 9-13), and flat washers (12, figure 9-13) from the left/right oxygen bed assemblies (4 and 5) on the center structure assembly (5, figure 9-13).

10. If necessary, remove damping pads (15 through 17, figure 9-13) by peeling free from the center structure assembly (5, figure 9-13).

11. Ensure that electrical tiedown cleats (6) are not missing or damaged. If necessary, replace.

9-62. PLASTIC TUBING REMOVAL. To remove the plastic tubing, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Plastic Bag	MIL-B-117
As Required	Rubber Band	ZZ-A-1415
As Required	Electrical Tiedown Straps	MS3367-4-9

WARNING

Because nonmetallic tubing is in the oxygen flow path, open ends must be bagged to maintain oxygen clean requirement when tubing is disconnected.

NOTE

Tag nonmetallic tubing by marking bags before removal for identification during installation.

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure plastic tubing is tagged or labeled prior to removal.

2. Remove only those electrical tiedown straps necessary to remove plastic tubing (40, 58 through 65, figure 9-11) and (40, figure 9-12) to be disconnected from the concentrator.

3. Disconnect plastic tubing from barb fitting by firmly pulling on tube. Place plastic bag over open ends of plastic tubing. Secure with rubber bands.

9-63. CLEANING OF DISASSEMBLED PARTS.

9-64. To clean the disassembled concentrator component parts, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Acetone	O-A-51
As Required	Toluene	TT-T-548
	or	
As Required	Xylene	TT-X-916
As Required	Nitrogen	A-A-59503
As Required	Distilled Water	NIIN 00-356-4936
As Required	Plastic Bags	MIL-B-117 (CAGE 81349)
As Required	Abrasive	MIL-A-9962 Type I, Grade AA

Support Equipment Required

Quantity	Description	Reference Number
1	Goggles or Face Shield	G-G-531 (NIIN 00-052-3776)
1	Regulator, Nitrogen	9-580 or equivalent

WARNING

When working with oxygen equipment, ensure that clothing, tubing, fittings, and equipment are free of oil, grease, fuel, hydraulic fluid, or any combustible liquid. Oil, or any material containing oil, even in minute quantity, in conjunction with high purity oxygen under pressure can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

1. Clean all electrical contact points by lightly furbishing with a fine abrasive material.

2. Clean all metallic parts using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free water-pumped nitrogen.

CAUTION

Do not attempt to clean any silicone rubber or elastic parts that have become contaminated with oil or grease. All such parts shall be replaced.

3. Prior to installation, wash all silicone rubber parts in distilled water and blow dry with oil-free water-pumped nitrogen.

4. Cleaned parts shall be sealed in plastic bags for storage. Also, bag all complete assemblies that are not immediately returned to service.

WARNING

Use goggles for eye protection when using xylene or toluene.

5. Remove old RTV adhesive by applying small amounts of xylene or toluene.

WARNING

Use goggles for eye protection when using acetone.

6. Remove old sealant from screws using small amounts of acetone.

9-65. INSPECTION OF DISASSEMBLED PARTS.

9-66. Carefully inspect the disassembled concentrator for cleanliness, irregular wear, and good condition using the following procedures and guidance.

1. Inspect all screws for nicks, burrs, rounded screwdriver slots, or other obvious damage; replace as necessary.

2. Inspect all metallic surfaces for corrosion, cleanliness, and other obvious damage; clean or replace parts as necessary.

3. Inspect molecular sieve bed assemblies for security of self-sealing machine screws, nicks in sealing surfaces, stripped threads in screw holes, and cleanliness; replace or repair as necessary.

4. Inspect electrical receptacle connectors for bent pins, corrosion, and cleanliness; clean or replace as necessary.

5. Inspect plastic tubing for cuts, breaks, and other obvious damage; replace as necessary.

6. Inspect shutoff valve/filter/regulator assembly (V1/FLTR1/REG1), plenum assembly (ACC1), and controller/monitor box assembly for good condition; replace if necessary.

7. Inspect outlet, inlet, and center structure assemblies and lifting straps for corrosion, breaks, and good condition; clean, repair, or replace as necessary.

8. Inspect check valve assemblies for smooth seating surfaces, cleanliness, bent or distorted springs, and freedom of operation; replace as necessary.

9-67. REPAIR.

9-68. Repair of the concentrator is limited to replacing defective component parts and minor repairs (small dents, scratches, abrasions, nicks, and other obvious damage) of tubing. To make minor repairs, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Alcohol, Isopropyl	TT-I-735
1	Brush	A-A-289
As Required	Compound, Sealant	Loctite 222
As Required	Instrument-Aircraft Grease	Christo-Lube or equivalent
As Required	Silicone Adhesive Sealant	Dow Corning 3145 Gray Sealant
As Required	Insulation Sleeving	M23053/5-103-0
As Required	Insulation Sleeving	M23053/5-104-0
As Required	Insulation Sleeving	M23053/5-106-0
As Required	Insulation Sleeving	M23053/5-109-0
As Required	Solder	QQ-S-571 Comp SN63
As Required	Tape, Antiseize	MIL-T-27730A
As Required	Tape, Pressure Sensitive	PPP-T-42
As Required	Wire, Nonelectrical	MS20995C20

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Round Nose, Extra Fine	Utica, #U431
1	Pliers, Flat Nose	Utica, #20-4-1/2 GCS
1	Pliers, Maximum Full Flush Cutters	Excelta, #119E1
1	Stripper, Stranded Wire	Ideal, #45-121
1	Stripper, Solid Wire	Ideal, #45-125
1	Wrench, Torque 30 in-lb	TE3A
1	Wrench, Torque 150 in-lb	TE12A

1. Tubing assemblies with minor dents not causing flow restriction are considered serviceable. Small scratches, abrasions, and nicks can be smoothed with a burnishing tool or aluminum wool.

2. To avoid burnishing the same area more than once, each burnished area shall be identified by a painted band. Bands shall be black in color and shall cover an area not less than 2 inches or more than 3 inches in length.

3. Tubing that is nicked, abraded, or scratched in an area that is identified as having been previously burnished shall be condemned.

9-69. ASSEMBLY.

NOTE

Equivalent tools or materials may be used as long as the integrity of the test, procedures, or equipment is not compromised.

Coat all preformed packings using Christo-Lube prior to installing unless otherwise noted.

9-70. PLASTIC TUBING INSTALLATION. To install plastic tubing (40, 58 through 65, figure 9-11) and (40, figure 9-12), proceed as follows:

WARNING

Because nonmetallic tubing is in the oxygen flow path, open ends must be bagged to maintain oxygen clean requirement when tubing is disconnected.

NOTE

When routing nonmetallic tubing through inlet, center, and outlet structure assemblies utilize holes protected with plastic grommets.

Tag nonmetallic tubing by marking bags before removal for identification during installation.

1. If plastic tubing must be replaced, cut plastic tubing to length prior to installation.

2. Remove plastic bags from ends of plastic tubing. Install plastic tubing on barb fittings as per tag or label.

9-71. CENTER STRUCTURE ASSEMBLY AND OXYGEN/NITROGEN BED ASSEMBLIES INSTALLATION. To install the center structure assembly (5, figure 9-13), left/right oxygen bed assemblies (4 and 5, figure 9-12) and left/right nitrogen bed assemblies (2 and 3, figure 9-12), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A
1	Wrench, Torque 0-150 in-lbs	TE12A

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure that the electrical tiedown cleats (6, figure 9-13) are not missing or damaged. If necessary, replace.

2. If eight damping pads (15 through 17, figure 9-13) were removed, install new damping pads (15 through 17, figure 9-13) by peeling off backing and pressing in place with adhesive-side down to the center structure assembly (5, figure 9-13).

NOTE

Nitrogen beds shall be replaced as a set.

The right nitrogen bed assembly (3, figure 9-11) shall be installed with three jackscrews and label (55, figure 9-11) facing up. The left nitrogen bed assembly (4, figure 9-11) shall be installed with three jackscrews and label (55, figure 9-11) facing up and one jackscrew facing down and inboard.

3. Align the center structure (5, figure 9-13) assembly over the right and left nitrogen bed assemblies (3 and 4, figure 9-11), then install two band clamps (8, figure 9-13) on the center structure assembly (5, figure 9-13), do not tighten two band clamps (8, figure 9-13).

NOTE

Oxygen beds shall be replaced as a set.

The right and left oxygen bed assemblies (5 and 6, figure 9-11) shall be installed with purge ports on the outlet side, on top, and facing inboard. See figure 9-11 for clarification.

4. Align the left and right oxygen bed assemblies (5 and 6, figure 9-11) on the center structure assembly (5, figure 9-13), then install four flat washers (12, figure 9-13), lockwashers (11), and plain hex nuts (10), do not tighten four plain hex nuts (10).

5. Install bed inlet structure assembly (15) onto nitrogen and oxygen bed assemblies (2, 3, 4 and 5).

6. Attach nitrogen bed assemblies (2 and 3) to bed inlet structure assembly (15) using washer (35) and self-locking nut (36) on outboard jackscrews, do not tighten nuts (36), refer to figure 9-12 for clarification.

7. Install four washers (35), lockwashers (34), and nuts (33) to remaining jackscrews on nitrogen bed assemblies (2 and 3), do not tighten nuts (33).

8. Attach oxygen bed assemblies (4 and 5) to bed inlet structure assembly (15) by installing six washers (35), lockwashers (34), and nuts (33) on oxygen bed assemblies (4 and 5), do not tighten nuts.

9. Install bed outlet structure assembly (1, figure 9-11) onto nitrogen and oxygen bed assemblies (3, 4, 5, and 6, figure 9-11).

10. Attach nitrogen bed assemblies (3 and 4, figure 9-11) to bed outlet structure assembly (1, figure 9-11) using washer (38, figure 9-11) and self-locking nut (39, figure 9-11) on outboard jackscrews, do not tighten nuts (39, figure 9-11), refer to figure 9-11 for clarification.

11. Install four washers (38, figure 9-11), lockwashers (37, figure 9-11), and nuts (36, figure 9-11) to remaining jackscrews on nitrogen bed assemblies (3 and 4, figure 9-11), do not tighten nuts (36, figure 9-11).

12. Attach oxygen bed assemblies (5 and 6, figure 9-11) to bed outlet structure assembly (1, figure 9-11) by installing six flatwashers (38, figure 9-11), lockwashers (37, figure 9-11), and nuts (36, figure 9-11) on oxygen bed assemblies (4 and 5, figure 9-11), do not tighten nuts.

13. Tighten all nuts (36 and 39, figure 9-11) connecting nitrogen and oxygen bed assemblies (3, 4, 5, and 6, figure 9-11) to bed outlet structure assembly (1, figure 9-11). Torque to a value of 10.0 to 11.0 in.-lbs.

14. Tighten all nuts (33 and 36) connecting nitrogen and oxygen bed assemblies (2, 3, 4 and 5) to bed inlet structure assembly (15). Torque to a value of 10.0 to 11.0 in.-lbs.

15. Tighten plain hex nuts (10, figure 9-13) securing oxygen bed assemblies (4 and 5) to center structure assembly (5, figure 9-13). Torque to a value of 10.0 to 11.0 in.-lbs.

16. Tighten two band clamps (8, figure 9-13) securing right and left nitrogen bed assemblies (3 and 4, figure 9-13) on the center structure assembly (5, figure 9-13).

17. Install two plain hex nuts (36, figure 9-11) on jack studs (9, figure 9-14). Slide jack studs (9, figure 9-14) on the inlet end of shutoff valve/filter/regulator assembly (7, figure 9-11) into bed outlet support structure (1, figure 9-11).

18. Install two flat washers (37, figure 9-11), lockwashers (38, figure 9-11), and nuts (36, figure 9-11) onto jack studs (9, figure 9-14) to hold shutoff valve/filter/regulator assembly (7, figure 9-11) to the bed outlet structure assembly (1, figure 9-11), do not tighten nuts.

19. Loosely attach band clamps (9, figure 9-13) holding shutoff valve/filter/regulator assembly (7, figure 9-11) to center structure assembly (5, figure 9-13).

20. Place PSA assembly (2, figure 9-10) on its side.

21. Remove protective cap plugs or tape from all holes on slide valve assembly (16).

22. Lightly lubricate preformed packing (14) using Christo-Lube, then align slide valve assembly (16) and preformed packing (14) on the shutoff/filter/regulator assembly (6). Install two socket head capscrews (11), each with lockwasher (12) and flat washer (13). Torque to a value of 54.0 to 57.0 in.-lbs.

23. Place PSA assembly (2, figure 9-10) flat.

24. Lightly lubricate preformed packing (26 and 22) using Christo-Lube. Install two elbows and tube assemblies (17) P/N 1653706-1 with preformed packing (26) at slide valve (16) end and install preformed packing (22) at right oxygen bed assembly (3) end and left nitrogen bed assembly (4) end.

25. Lightly lubricate preformed packing (26 and 22) using Christo-Lube. Install two elbows and tube assemblies (48) P/N 1653707-1 with preformed packing (26) at slide valve (16) end and install preformed packing (22) at left oxygen bed assembly (5) end and right nitrogen bed assembly (2) end.

26. Install elbow retainer (18), each with three socket head capscrews (19), lockwashers (20), flat washers (21), to each elbow and tube assembly (17 and 48) at the end attached to the oxygen bed assemblies (4 and 5) and nitrogen bed assemblies (2 and 3). Torque to a value of 18.5 to 21.0 in.-lbs.

27. Install two socket head capscrews (23), each with lockwasher (24) and flat washer (25), to each elbow and tube assembly (17 and 48) at the end attached to the slide valve (16). Torque to a value of 18.5 to 21.0 in.-lbs.

28. Install four socket head capscrews (37), lockwashers (38), and flat washers (39) securing slide valve assembly (16) to bed inlet structure assembly (15). Torque to a value of 18.5 to 21.0 in.-lbs.

29. Install labeled plastic tubing EXH (44) and labeled plastic tubing DRAIN (40) on tube fittings on exhaust port of the slide valve.

30. Adjust two plain hex nuts (36, figure 9-11) on jack studs (9, figure 9-14) between the inlet end of shutoff valve/filter/regulator assembly (7, figure 9-11) and the bed outlet support structure (1, figure 9-11) until both plain hex nuts (36, figure 9-11) are resting against the bed outlet support structure (1, figure 9-11).

31. Torque two plain hex nuts (36, figure 9-11) securing the shutoff valve/filter/regulator assembly (7, figure 9-11) on the output end of the PSA assembly (2, figure 9-10) to a value of 10 to 11 in.-lbs.

32. Install one end of labeled plastic tubing DRAIN (40) to DRAIN port (12, figure 9-14) of shutoff/filter/regulator assembly (6) and other end to slide valve (16) DRAIN port on EXHAUST port.

33. Install plenum assembly (ACC1) (paragraph 9-80).

9-72. SLIDE VALVE ASSEMBLY (V2) INSTALLATION. To install slide valve assembly (16, figure 9-12), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A
1	Wrench, Torque 0-150 in-lbs	TE12A

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from the exhaust end.

2. Remove protective cap plugs or tape from all holes on slide valve assembly (16).

3. Lightly lubricate preformed packing (14) using Christo-Lube, then align slide valve assembly (16) and preformed packing (14) on the shutoff/filter/regulator assembly (6). Install two socket head capscrews (11), each with lockwasher (12) and flat washer (13). Torque to a value of 54.0 to 57.0 in.-lbs.

4. Place PSA assembly (2, figure 9-10) on its side to gain access to the plenum assembly (ACC1) (1).

5. Install plain hex nut (8), lockwasher (9), and flat washer (10) to the support stud on the closed end of plenum assembly ACC1 (1). Torque to a value of 4.0 to 6.0 in.-lbs.

6. Place PSA assembly (2, figure 9-10) on a flat bench surface with bottom side down, then work from the exhaust end.

7. Install labeled plastic tubings V2 (62 and 63, figure 9-11) and labeled plastic tubing REG1 (64, figure 9-11) to the slide valve (16) at the ports labeled with identification markers V2 and REG1 (45 and 46).

8. Install the bed inlet structure assembly (paragraph 9-73).

9-73. BED INLET STRUCTURE ASSEMBLY INSTALLATION. To install the bed inlet structure assembly (15, figure 9-12), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from the exhaust end.

2. Install captive screw (41), flat washer (42), and external retainer ring (43), if removed.

3. Install lifting strap (27) with strap plate (28) by installing four socket head capscrews (29), each with lockwasher (30), flat washer (31), and plain hex nut (32), if removed. Torque to a value of 10.0 to 11.0 in.-lbs.

NOTE

Remove protective caps from ends of nitrogen bed assemblies (2 and 3) and oxygen bed assemblies (4 and 5).

4. Align bed inlet structure assembly (15), then install ten plain hex nuts (33), each with lockwasher (34) and flat washer (35), and install two flat washers (35) and self-locking nuts (36) to nitrogen bed assemblies (2 and 3) and oxygen bed assemblies (4 and 5) on the exhaust end of the PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

5. Lightly lubricate preformed packing (26 and 22) using Christo-Lube. Install two elbows and tube assemblies (17) P/N 1653706-1 with preformed packing (26) at slide valve (16) end and install preformed packing (22) at right oxygen bed assembly (3) end and left nitrogen bed assembly (4) end.

6. Lightly lubricate preformed packing (26 and 22) using Christo-Lube. Install two elbows and tube assemblies (48) P/N 1653707-1 with preformed packing (26) at slide valve (16) end and install preformed packing (22) at left oxygen bed assembly (5) end and right nitrogen bed assembly (2) end.

7. Install elbow retainer (18), each with three socket head capscrews (19), lockwashers (20), flat washers (21), to each elbow and tube assembly (17 and 48) at the end attached to the oxygen bed assemblies (4 and 5) and nitrogen bed assemblies (2 and 3). Torque to a value of 18.5 to 21.0 in.-lbs.

8. Install two socket head capscrews (23), each with lockwasher (24) and flat washer (25), to each elbow and tube assembly (17 and 48) at the end attached to the slide valve (16). Torque to a value of 18.5 to 21.0 in.-lbs.

9. Install four socket head capscrews (37), lockwashers (38), and flat washers (39) securing slide valve assembly (16) to bed inlet structure assembly (15). Torque to a value of 18.5 to 21.0 in.-lbs.

10. Install labeled plastic tubing EXH (44) and labeled plastic tubing DRAIN (40) on tube fittings on exhaust port of the slide valve (16).

9-74. TUBE FITTINGS DISC ASSEMBLY, ASSEMBLY. To assemble tube fittings disc assembly (7, figure 9-10), proceed as follows:

NOTE

Index numbers refer to figure 9-18 unless otherwise noted.

1. If removed, install tubular spring pin (11) into tube retainer disc (1).

2. Lightly lubricate new preformed packing (12) using Christo-Lube, then install vacuum fitting (5) with new inlet filter (6) and new preformed packing (12) into tube retainer disc (1), then install the external retainer ring (7) on the back side of the tube retainer disc (1) securing vacuum fitting (5).

3. Lightly lubricate new preformed packing (10) using Christo-Lube, then install tube fitting barb (8) with new preformed packing (10) into tube retainer disc (1), then install the external retainer ring (9) on the front side of the tube retainer disc (1) securing tube fitting barb (8).

4. Install captive screw (2) and flat washer (4) to tube retainer disc (1), then install the external retainer ring (3) on the back side of the tube retainer disc (1) securing captive screw (2).

9-75. TUBE FITTINGS DISC ASSEMBLY INSTALLATION. To install the tube fittings disc assembly, proceed as follows:

NOTE

Index numbers refer to figure 9-10 unless otherwise noted.

1. Install eight labeled plastic tubings (58 through 65, figure 9-11) by gently pushing onto eight tube fitting barbs (8, figure 9-18).

2. Install tube fitting disc assembly (7) by aligning tubular spring pin (11) on back of controller/monitor assembly (1), then push tube fittings disc assembly (7) on to back of controller/monitor assembly (1) as necessary. Tighten captive screw (8) to secure tube fittings disc assembly (7) to controller/monitor assembly (1).

9-76. BED OUTLET STRUCTURE ASSEMBLY INSTALLATION. To install bed outlet structure assembly (1, figure 9-11), proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in minute quantity, coming in contact with oxygen can cause explosion or fire. Dust, lint, and fine metal particles are also dangerous.

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from output end.

2. Install band clamp (7, figure 9-13) on plenum retainer flange (67) at output end of plenum assembly (ACC1) (2).

3. Install two flat washers (38), lockwashers (37), and plain hex nuts (36) to the shutoff valve/filter/regulator assembly (7) on the output end of the PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

4. Install three flat washers (38, figure 9-11), lockwashers (37), and plain hex nuts (36); then install flat washer (38) and self-locking nut (39) to the left nitrogen bed assembly (4) on the output end of the PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

5. Install two flat washers (38), lockwashers (37), and two plain hex nuts (36); then install one flat washer (38) and self-locking nut (39) to the right nitrogen bed assembly (3) on the output end of the PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

6. Install five flat washers (38), lockwashers (37), and plain hex nuts (36) to left oxygen bed assembly (6) on output end of PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

7. Install three flat washers (38), lockwashers (37), and plain hex nuts (36) to right oxygen bed assembly (5) on output end of PSA assembly (2, figure 9-10). Torque to a value of 10.0 to 11.0 in.-lbs.

8. Install nitrogen check valves (CV3, CV4, and CV5) (paragraph 9-81).

9. Install oxygen check valves (CV1 and CV2) (paragraph 9-82).

10. Install labeled plastic tubing N_2 (59) to tube fitting (11) on tapped nipple (10) between left nitrogen bed assembly and right nitrogen bed assembly (3 and 4) on output end of the PSA assembly (2, figure 9-10).

11. Install labeled plastic tubing O_2 (60) to oxygen output port labeled with identification marker O_2 (51) on plenum assembly (ACC1) (2).

12. Install plastic crossover tubing (40) between left oxygen bed assembly and right oxygen bed assembly (6 and 5) on output end of PSA assembly (2, figure 9-10).

13. Install controller/monitor assembly (paragraph 9-83).

9-77. SHUTOFF VALVE/FILTER ASSEMBLY (V1/FLTR1) ASSEMBLY. To assemble the shutoff valve/filter assembly (V1/FLTR1) (1, figure 9-13), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound Sealant	Loctite 222
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A
1	Wrench, Torque 0-150 in-lbs	TE12A
1	Spanner Socket Wrench	3309452-1

NOTE

Index numbers refer to figure 9-15 unless otherwise noted.

For installation of inlet filter (18) only, refer to steps 9 through 12.

1. Ensure shutoff valve base (1) is in the upright position.

2. Lightly lubricate new preformed packing (15) using Christo-Lube, then using spanner socket wrench install new filter assembly (14), with new preformed packing (15) attached, at the port labeled with identification marker IN (16) by tightening filter assembly (14) into the shutoff valve base (1). Torque to a value of 7.0 to 10.0 in.-lbs.

3. Ensure that the identification marker IN (16) at filter assembly (14) is readable and intact on the shutoff valve base (1). If not, replace as required.

4. Align shutoff cap (7) with tube fitting (13), spring (11) and shutoff diaphragm assembly (12), then position on shutoff valve base (1), align grooves on shutoff valve base (1) and shutoff cap (7). Apply sealing compound (Loctite 222) to six socket head capscrews (8). Install six socket head capscrews (8) with lockwashers (9) and flat washers (10). Torque to a value of 33.0 to 35.0 in.-lbs.

5. Ensure that the V1 label (17) on shutoff cap (7) is readable and intact. If not, replace as required.

6. Apply sealing compound (Loctite 222) to two jack studs (9, figure 9-14). Install two jack studs (9, figure 9-14) with flat washers (10, figure 9-14) to the shutoff cap (7).

7. Attach plain hex nut (20) to the filter rod (19), then install filter rod (19) with plain hex nut (20) attached to the shutoff valve base (1).

8. Lightly lubricate new preformed packing (3) using Christo-Lube, then install the inlet unit elbow (2) and new preformed packing (3) by installing two socket head capscrews (4), each with lockwasher (5) and flat washer (6).

9. Lightly lubricate new preformed packing (22) using Christo-Lube, then attach the filter element (18), new preformed packing (22), and swirler (21) to the shutoff valve base (1) by installing castellated plain nut (23) and cotter pin (24) at the end of the filter rod (19).

10. Lightly lubricate new preformed packing (13, figure 9-14) using Christo-Lube, then position the shutoff valve and filter assembly (1, figure 9-14) and new preformed packing (13, figure 9-14) in the adapter and tube assembly (3, figure 9-14) from end opposite drain (12).

11. Install five flat washers (6, figure 9-14), lockwashers (5, figure 9-14), and plain hex nuts (7, figure 9-14) on five socket head capscrews (4, figure 9-14) and flat washers (6, figure 9-14) to couple the shutoff valve and filter assembly (1) to the adapter and tube assembly (3). Torque to a value of 10.0 to 11.0 in.-lbs.

12. Install shutoff valve/filter/regulator (reducer) assemblies (V1/FLTR1/REG1), refer to Shutoff Valve/Filter/Regulator (Reducer) Assemblies (V1/FLTR1/REG1) Installation (paragraph 9-79).

9-78. REDUCER ASSEMBLY (REG1) ASSEMBLY. To assemble the reducer assembly (REG1) (2, figure 9-14), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Compound Sealant	Loctite 222
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A
1	Wrench, Torque 0-150 in-lbs	TE12A

NOTE

Index numbers refer to figure 9-16 unless otherwise noted.

1. Assemble the diaphragm assembly (5) by aligning the diaphragm piston (4, figure 9-17), rolling diaphragm (3, figure 9-17), and diaphragm retainer plate (2, figure 9-17). Then place the regulator piston rod (1, figure 9-17), with sealing compound (Loctite 222) applied to threads, through the center hole from the diaphragm retainer plate (2, figure 9-17) side. Secure with flat washer (5, figure 9-17), lockwasher (6, figure 9-17), and plain hex nut (7, figure 9-17).

2. Ensure regulator base (1), with socket head capscrew (2) at test port labeled with identification marker TP1 (3), is in the upright position.

3. Ensure that identification marker TP1 (3) on the regulator base (1) is readable and intact. If not, replace as required.

4. Install the flanged bearing (4) in the regulator base (1) by slightly pressing the flanged bearing (4) into the regulator base (1).

5. Install the diaphragm assembly (5) in the regulator base (1) by sliding the regulator piston rod (1, figure 9-17) through the flanged bearing (4) into the regulator base (1).

6. Lightly lubricate new preformed packing (7) using Christo-Lube, then install on the regulator piston (6).

7. Install regulator piston (6) and preformed packing (7) to the regulator piston rod (1, figure 9-17), with threads coated with sealing compound (Loctite 222), of the diaphragm assembly (5) by installing plain hex nut (8) to the regulator piston rod (1, figure 9-17).

8. Slide deswirler (9) over the regulator piston (6) and preformed packing (7), then secure with four socket head capscrews (10), each with lockwasher (11) and flat washer (12). Torque to a value of 18.5 to 21.0 in.-lbs.

9. Align the spring cover (13) with setscrew (19), spring retainer (18), and spring (17), then attach to the regulator base (1) by installing six socket head capscrews (14), each with lockwasher (15) and flat washer (16). Torque to a value of 30.0 to 35.0 in.-lbs.

10. Lightly lubricate new preformed packing (13, figure 9-14) using Christo-Lube, then position the reducer assembly (2) and preformed packing (13) on the adapter and tube assembly (3).

11. Secure reducer assembly (2) to adapter and tube assembly (3) by installing five flat washers (6) and self-locking nuts (8). Torque to a value of 10.0 to 11.0 in.-lbs.

12. Ensure that the identification marker DRAIN (11) is readable and intact. If not, replace as required.

13. Ensure tube fitting (12) on the adapter and tube assembly (3) is open and undamaged. If not, replace as required.

14. Install shutoff valve/filter/regulator (reducer) assemblies (V1/FLTR1/REG1), refer to Shutoff Valve/Filter/Regulator (Reducer) Assemblies (V1/FLTR1/REG1) Installation (paragraph 9-79).

9-79. SHUTOFF VALVE/FILTER/REGULATOR (REDUCER) ASSEMBLIES (V1/FLTR1/REG1) INSTALLATION. To install shutoff valve/filter/regulator assemblies (V1/FLTR1/REG1) (6, figure 9-12), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A
1	Wrench, Torque 0-150 in-lbs	TE12A

NOTE

Index numbers refer to figure 9-12 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove tape or protective plug from the slide valve assembly (16) inlet hole.

3. Lightly lubricate new preformed packing (14) using Christo-Lube, then install preformed packing (14) in the input flange on the shutoff valve/filter/regulator assembly (16).

4. Install labeled plastic tubing DRAIN (40) onto the tube fitting (12, figure 9-14) at identification marker DRAIN (11, figure 9-14) on the bottom of the shutoff valve/filter/regulator assembly (16).

5. Install labeled plastic tubing V1 (61, figure 9-11) to port labeled with identification marker V1 (17, figure 9-15) on the input end of the shutoff valve/filter/regulator assembly (16).

6. Install labeled plastic tubing IN (58, figure 9-11) to the filter assembly (14, figure 9-15) tube fitting at port labeled with identification marker IN (16) on the input end of the shutoff valve/filter/regulator assembly (16).

7. Install two plain hex nuts (36, figure 9-11) on jack studs (9, figure 9-14). Slide jack studs (9, figure 9-14) on the inlet end of the shutoff valve/filter/regulator assembly (7, figure 9-11) into bed outlet support structure (1, figure 9-11), then set the inlet end of the shutoff valve/filter/regulator assembly (6) into place on the slide valve assembly (16).

8. Install two socket head capscrews (11), each with lockwasher (12) and flat washer (13), to couple the shutoff valve/filter/regulator assembly (6) to the slide valve assembly (16). Torque to a value of 54 to 57 in.-lbs.

9. Adjust two nuts (36, figure 9-11), previously installed on jack studs (9, figure 9-14) up to the bed outlet structure assembly (1, figure 9-11).

10. Install two flat washers (37, figure 9-11), lockwashers (38, figure 9-11), and nuts (36, figure 9-11) onto jack studs (9, figure 9-14) to hold shutoff valve/filter/regulator assembly (7, figure 9-11) to the bed outlet structure assembly (1, figure 9-11). Torque to a value of 10.0 to 11.0 in.-lbs.

11. Tighten clamping screw on band clamp (9, figure 9-13) holding the shutoff valve/filter/regulator assembly (7, figure 9-11) to the center structure assembly (5, figure 9-13).

9-80. PLENUM ASSEMBLY (ACC1) INSTALLATION. To install plenum assembly (ACC1) (2, figure 9-11), proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with left or right side down for access to the support stud on the closed end of plenum assembly (ACC1) (1, figure 9-12) and clamping screws on the band clamps (7, figure 9-13), then work from output end.

2. If the sticky-backed damping pad (66) was removed, install new damping pad (66) on output end of plenum assembly (ACC1) (2).

3. Place band clamps (7, figure 9-13) over plenum assembly (ACC1) (2), located to clamp center structure assembly (5, figure 9-13) and plenum retainer flange (67). Band clamps (7, figure 9-13) may need to be wiggled into a nonbinding position or loosened further to allow free movement over center structure assembly (5, figure 9-13) and plenum retainer flange (67).

4. Slowly place plenum assembly (ACC1) (2) into PSA assembly (2, figure 9-10), inserting the stud assembly on the closed end of plenum assembly (ACC1) (1, figure 9-12) into plenum mount bracket (47, figure 9-12) on the slide valve assembly (16, figure 9-12); then place the output end of plenum assembly (ACC1) (2) flush with plenum retainer flange (67).

5. Rotate PSA assembly (2, figure 9-10) on side, then install flat washer (10, figure 9-12), lockwasher (9, figure 9-12), and plain hex nut (8, figure 9-12) on the support stud on the closed end of plenum assembly (ACC1) (1, figure 9-12) finger tight.

6. Install oxygen check valves (CV1 and CV2) (paragraph 9-82).

7. Slide band clamp (7, figure 9-13) over plenum retainer flange (67), and place center band clamp (7, figure 9-13) over edge of center structure assembly (5, figure 9-13). Tighten clamping screw on both band clamps (7, figure 9-13) on plenum assembly (ACC1) (2, figure 9-13). The band clamp (7, figure 9-13) should be tight enough to prevent movement of plenum assembly (ACC1) (2, figure 9-13).

8. Install the nitrogen check valves (CV3, CV4 and CV5) (paragraph 9-81).

9. Install labeled plastic tubing O_2 (60) to the oxygen output port labeled with identification marker O_2 (51) on plenum assembly (ACC1) (2).

10. Torque plain hex nut (8, figure 9-12), lockwasher (9, figure 9-12), and flat washer (10, figure 9-12) on the support stud on the closed end of plenum assembly (ACC1) (1, figure 9-12) to a value of 4.0 to 6.0 in.-lbs.

11. Install remaining plastic tubing previously removed.

12. Install controller/monitor assembly (paragraph 9-83).

9-81. NITROGEN CHECK VALVES (CV3, CV4, AND CV5) INSTALLATION. To install nitrogen check valves (CV3, CV4 and CV5) assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from output end.

2. Remove protective cap plugs (NAS834-53) from the nitrogen bed (3 and 4) outlets.

3. Lightly lubricate new preformed packing (46 and 48) using Christo-Lube.

4. Install check valve (CV3) (45) with preformed packing (46) and check valve (CV4) (47) with preformed packing (48), then install cover and tube (9), tapped nipple (10) with tube fitting (11), and check valve assembly (CV5) (8).

5. Install four socket head capscrews (12), each with lockwasher (13) and flat washer (14), to the check valve assembly (CV5) (8) on the right nitrogen bed assembly (3) finger tight.

6. Install four socket head capscrews (15), each with lockwasher (16) and flat washer (17), to the cover and tube fitting (9) of the left nitrogen bed assembly (4) finger tight.

CAUTION

When tightening flared fittings on cover and tube (9) and check valve assembly (CV5) (8) onto tapped nipple (10) be careful not to damage tube fitting (11) on tapped nipple (10).

7. Tighten two coupling nuts on the cover tube (9) and the check valve assembly (CV5) (8) with tapped nipple (10) between then below plenum assembly (ACC1) (2), then torque four socket head capscrews (12) and four socket head capscrews (15) to a value of 18.5 to 21.0 in.-lbs.

9-82. OXYGEN CHECK VALVES (CV1 AND CV2) INSTALLATION. To install oxygen check valves (CV1 and CV2), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque 0-30 in-lbs	TE3A

NOTE

Index numbers refer to figure 9-11 unless otherwise noted.

1. Ensure PSA assembly (2, figure 9-10) is placed on a flat bench surface with bottom side down, then work from output end.

NOTE

Ensure filters (21 and 28) are inserted into plenum (2) ports labeled with identification markers FLTR3 and FLTR4 (52 and 53).

2. Install coupling nut (19) on the left oxygen tube (18) and coupling nut (26) on the right oxygen tube (25) at plenum assembly (ACC1) (2) inlets FLTR3 and FLTR4, finger tight.

3. Remove protective cap plugs (NAS834-53) from the oxygen bed outlets.

4. Lightly lubricate new preformed packing (34 and 44) using Christo-Lube, then install on spacer (35) and check valve (CV2) (43).

5. Install check valve (CV2) with preformed packing (44) and spacer (35) with preformed packing (34) into the opening of the right oxygen bed assembly (5), then install the right oxygen tube (25) with outlet fitting (33).

6. Install four socket head capscrews (29), each with lockwasher (30) and flat washer (31), in the right outlet fitting of oxygen bed assembly (5) finger tight.

7. Lightly lubricate new preformed packing (42) using Christo-Lube, then install on check valve (CV1) (41).

8. Install check valve (CV1) (41) with preformed packing (42) into the opening of the left oxygen bed assembly (6), then install the left oxygen tube and outlet fitting (32).

9. Install four socket head capscrews (22), each with lockwasher (23) and flat washer (24), in the left outlet fitting of oxygen bed assembly (6).

10. Torque coupling nut (19) on the left oxygen tube (18) and coupling nut (26) on the right oxygen tube (25) to 200 to 225 in.-lbs., then torque four socket head capscrews (22) and four socket head capscrews (29) to a value of 18.5 to 21.0 in.-lbs.

9-83. CONTROLLER/MONITOR ASSEMBLY INSTALLATION. To install the controller/monitor assembly (1, figure 9-10), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Grease, Aircraft and Instrument, Fuel and Oxidizer Resistant	Christo-Lube or equivalent

NOTE

Index numbers refer to figure 9-10 unless otherwise noted.

1. Ensure PSA assembly (2) is placed on a flat bench surface with bottom side down, then work from output end.

2. Align the controller/monitor assembly (1) on the bed outlet structure assembly (11), then tighten four front-accessible captive socket head mounting screws (9).

3. Tighten captive socket head mounting screw (10) to back of the bed outlet structure assembly near the top of controller/monitor assembly (1).

4. Remove socket head capscrew (3), with flat washer (4) and lockwasher (5), and move grounding strap assembly (6) into position over socket head capscrew (3) opening. Replace socket head capscrew (3), lockwasher (5), and flat washer (4).

5. Ensure that eight preformed packings (10, figure 9-18) and preformed packing (12, figure 9-18) have been lightly lubricated, using Christo-Lube, on tube fitting disc assembly (7).

6. Install tube fitting disc assembly (7) to back of the controller/monitor assembly (2) by aligning tube fitting disc assembly (7) with opening on back of controller/monitor assembly (2), then tightening captive screw (8) to draw the tube fitting disc assembly (7) into controller/monitor assembly (2).

9-84. SCHEDULED MAINTENANCE.

9-85. REPLACEMENT OF INLET FILTER ELEMENT. Prior to testing or repair of the concentrator or after 500 flight hours of service life, remove and replace the inlet filter element. Refer to Shutoff Valve/Filter Assembly (V1/FLTR1) Disassembly (paragraph 9-54) and Shutoff Valve/Filter Assembly (V1/FLTR1) Assembly (paragraph 9-77) for instructions.

Section 9-5. Illustrated Parts Breakdown

9-86. GENERAL.

9-87. This section lists and illustrates the assemblies and detail parts of the O_2N_2 Concentrator, Type GGU-xx/A, P/N 3261129-0101 and 3261129-0102, manufactured by Litton Systems, Inc. (CAGE 99251).

9-88. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

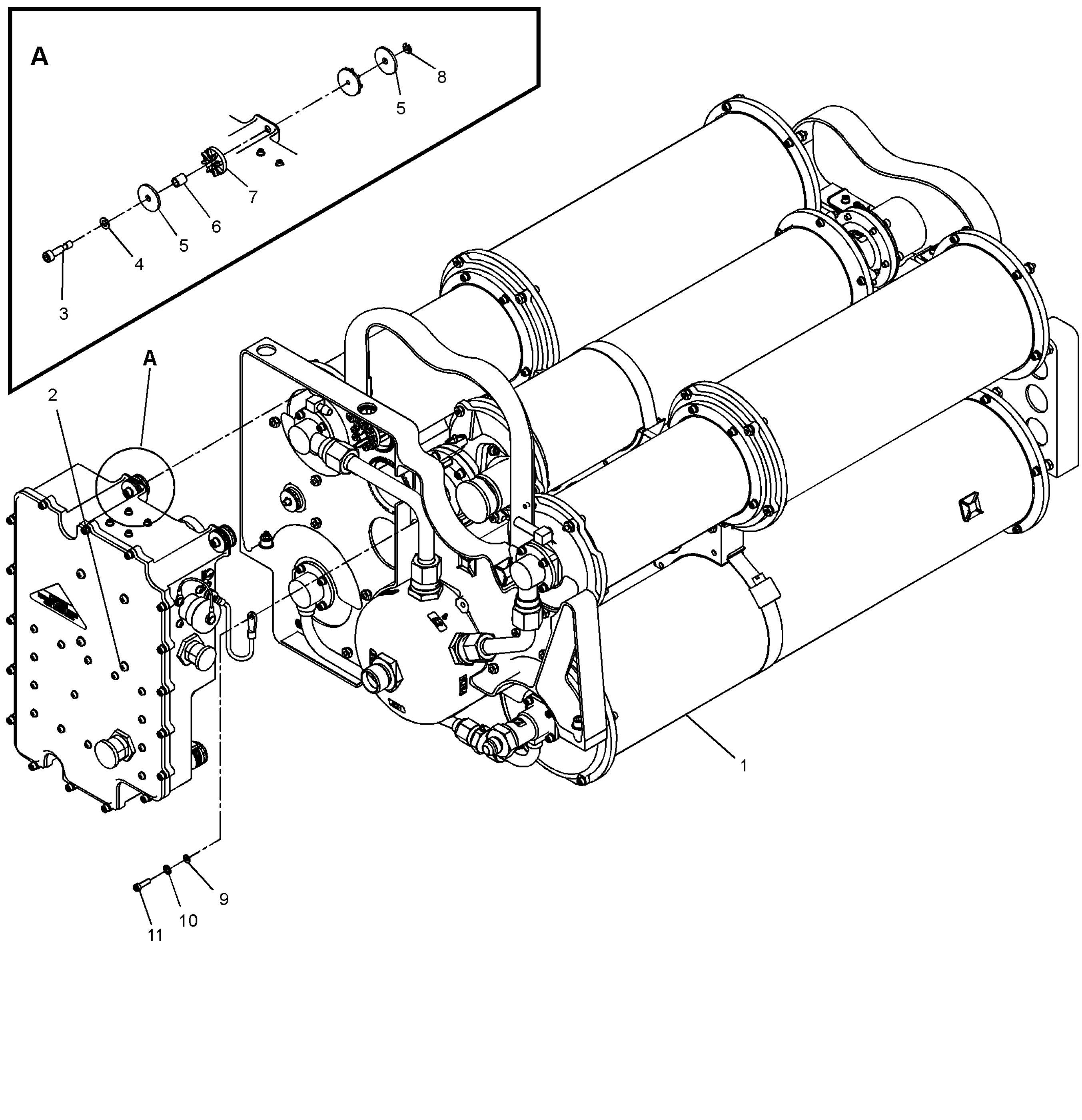


Figure 9-19. O_2N_2 Concentrator, Type GGU-xx/A, P/NS 3261129-0101 and 3261129-0102 (Product Output End)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-19	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	. CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	. CONCENTRATOR ASSEMBLY	REF	B,C
-1	1656576-1	. . PRESSURE SWING ADSORPTION UNIT (BREAKDOWN, Figure 9-20)	1	A
-1	1653710-1	. . PRESSURE SWING ADSORPTION UNIT (BREAKDOWN, Figure 9-20)	1	B,C
-2	1653700-1	. . CONTROLLER/MONITOR ASSEMBLY	1	
		(ATTACHING PARTS)		
-3	1653879-1	. . . SCREW, Captive, Damper	4	
-4	NAS620-8	. . . WASHER, Flat	4	
-5	1653878-1	. . . RETAINER, Isolation Damper	8	
-6	1654017-1	. . . SLEEVE	4	
-7	G-431-1	. . . GROMMET, Vibration Damping (1M331) (VID 1653873-1)	4	
-8	MS16633-1015	. . . RING, Retaining, External	4	
-9	NAS620-6	. . WASHER, Flat	1	
-10	MS35335-30	. . WASHER, Lock	1	
-11	NAS1352-06-8P	. . SCREW, Cap, Socket Head	1	
		---*---		

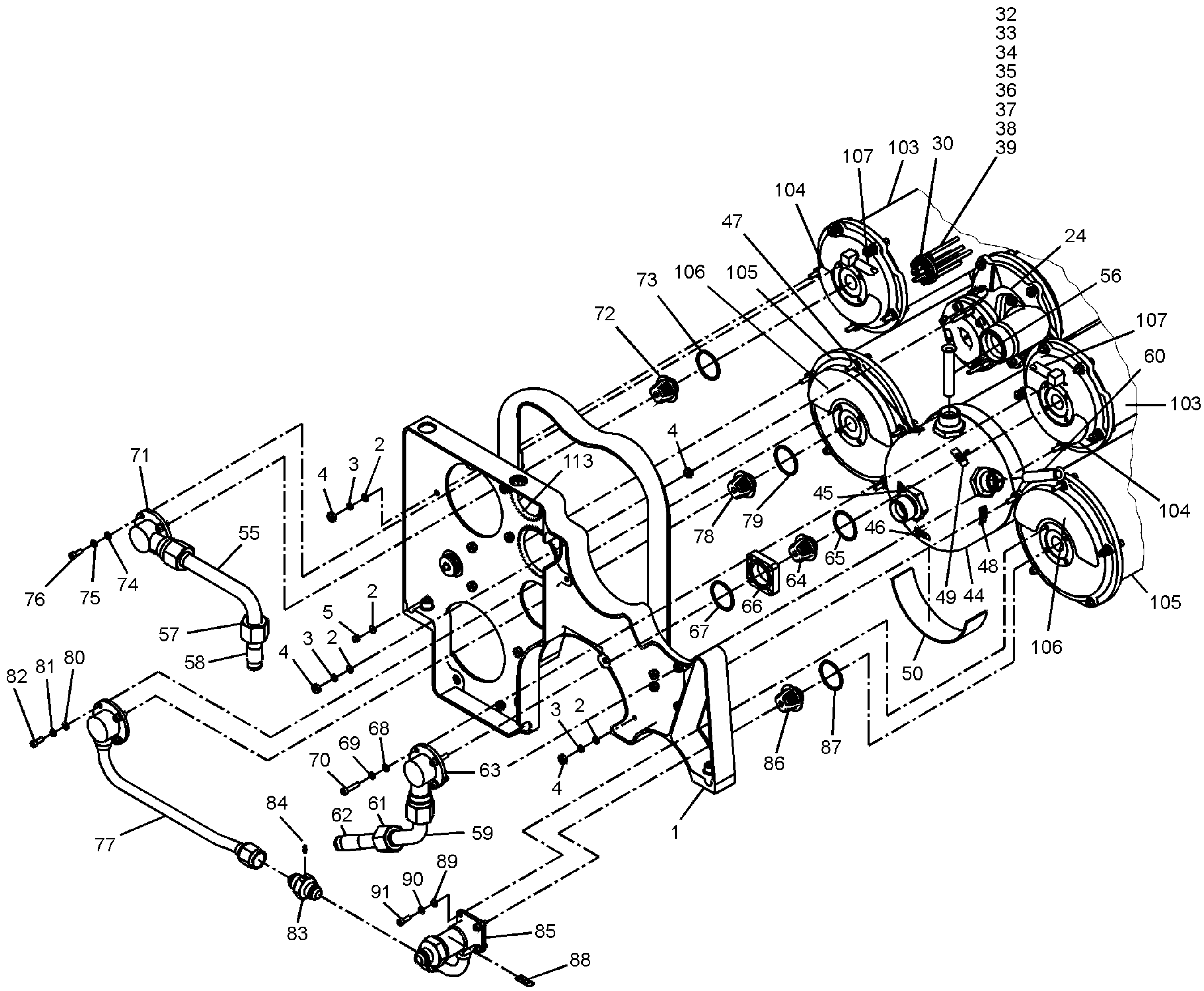


Figure 9-20. Pressure Swing Adsorption Unit, P/N 1653710-1 (Product Output End) (Sheet 1 of 3)

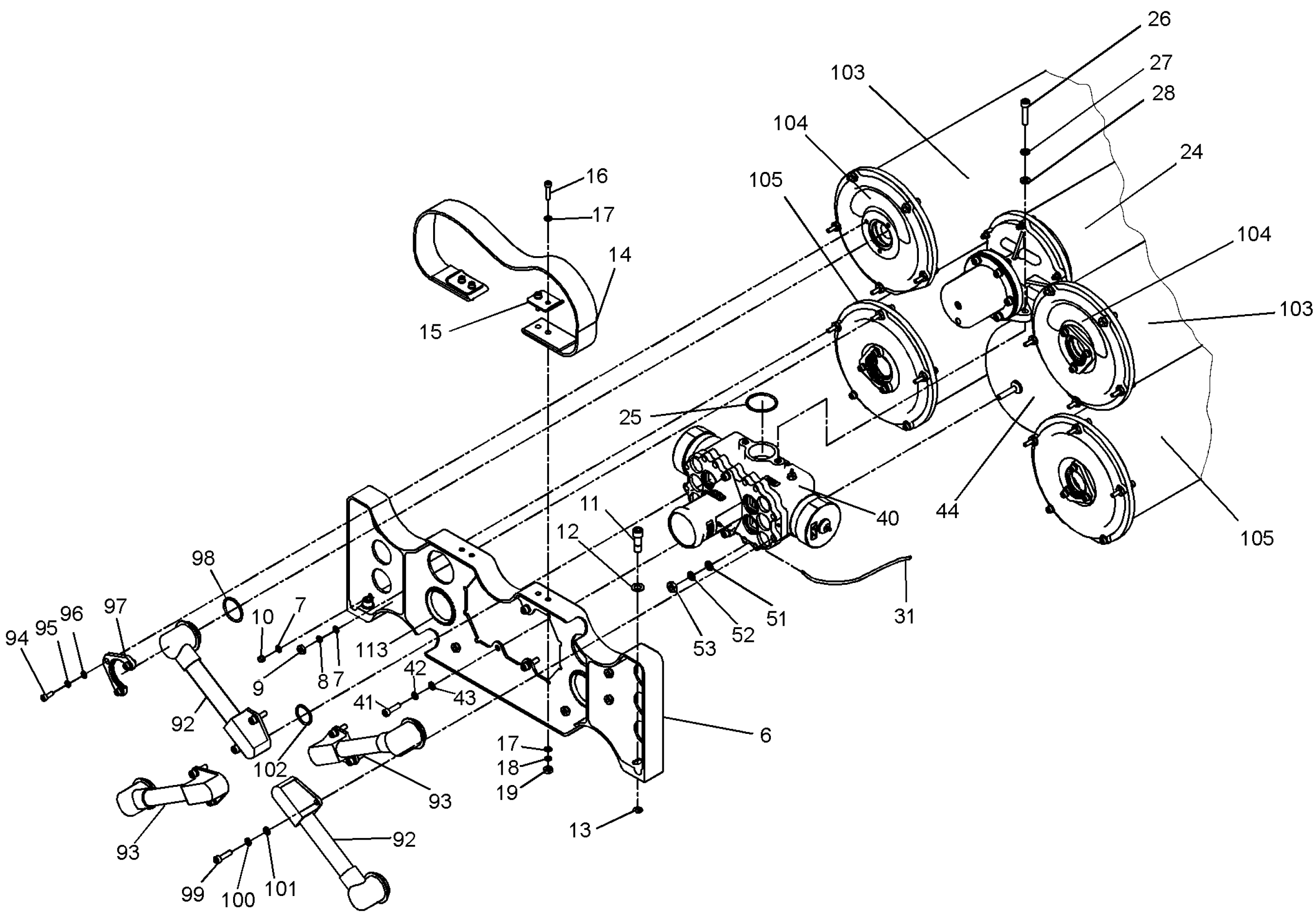


Figure 9-20. Pressure Swing Adsorption Unit, P/N 1653710-1 (Center) (Sheet 2 of 3)

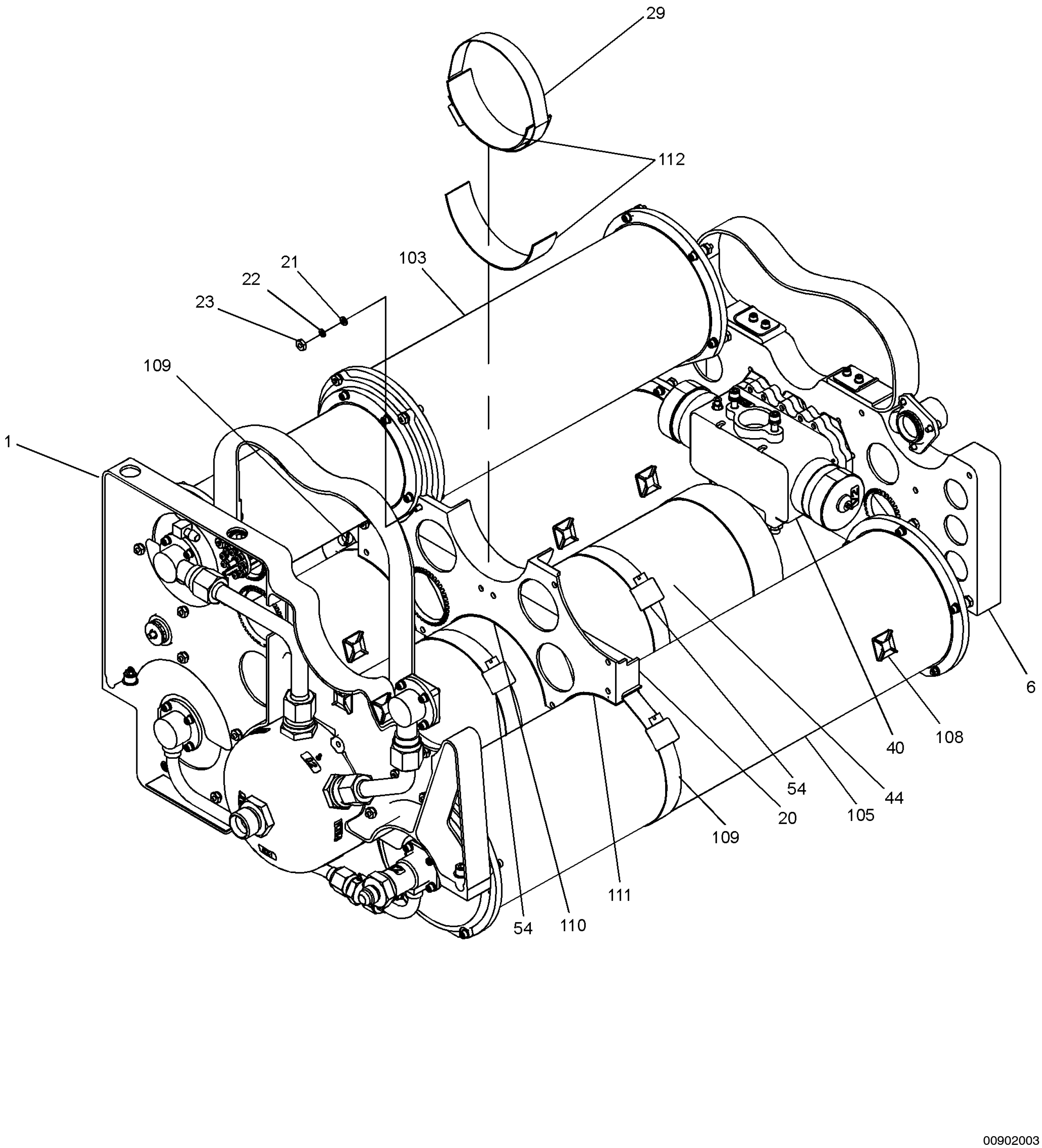


Figure 9-20. Pressure Swing Adsorption Unit, P/N 1653710-1 (Exhaust End) (Sheet 3 of 3)

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-20	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
-1	1653714-1	. STRUCTURE ASSEMBLY, Bed Outlet (BREAKDOWN, Figure 9-26)	1	
		(ATTACHING PARTS)		
-2	NAS620-6	. WASHER, Flat	17	
-3	MS35338-41	. WASHER, Lock	15	
-4	MS35649-262	. NUT, Plain, Hex	17	
-5	MS21042-06	. NUT, Self-Locking	2	
		---*---		
-6	1653715-1	. STRUCTURE ASSEMBLY, Bed Inlet	1	
		(ATTACHING PARTS)		
-7	NAS620-6	. WASHER, Flat	12	
-8	MS35338-41	. WASHER, Lock	10	
-9	MS35649-262	. NUT, Plain, Hex	10	
-10	MS21042-06	. NUT, Self-Locking	2	
		---*---		
-11	1654016-1	. . SCREW, Captive	2	
-12	NAS620-416L	. . WASHER, Flat	2	
-13	MS16633-4018	. . RING, Retaining, External	2	
-14	1653872-1	. STRAP, Lifting	1	
-15	1653851-1	. PLATE, Strap	2	
-16	NAS1352-06-10P	. SCREW, Cap, Socket Head	4	
-17	NAS620-6	. WASHER, Flat	8	
-18	MS35338-41	. WASHER, Lock	4	
-19	MS35649-262	. NUT, Plain, Hex	4	
-20	1653716-1	. STRUCTURE ASSEMBLY, Center	1	
		(ATTACHING PARTS)		
-21	NAS620-6	. WASHER, Flat	4	
-22	MS35338-41	. WASHER, Lock	4	
-23	MS35649-262	. NUT, Plain, Hex	4	
		---*---		
-24	1653720-1	. SHUTOFF VALVE/FILTER/REGULATOR ASSEMBLY (BREAKDOWN, Figure 9-21)	1	
-25	AS3582-023	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-26	NAS1351-3-14P	. SCREW, Cap, Socket Head	2	
-27	MS35338-43	. WASHER, Lock	2	
-28	NAS620-10	. WASHER, Flat	2	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-20-29	MS35842-15	. CLAMP, Band	1	
		---*---		
30	1653870-1	. DISC ASSEMBLY	1	
		(BREAKDOWN, Figure 9-25)		
-31	1653845-1	. TUBING, Plastic-Labeled DRAIN	1	
-32	1653845-2	. TUBING, Plastic-Labeled IN	1	
-33	1653845-3	. TUBING, Plastic-Labeled N_2	1	
-34	1653845-4	. TUBING, Plastic-Labeled O_2	1	
-35	1653845-5	. TUBING, Plastic-Labeled V1	1	
-36	1653845-6	. TUBING, Plastic-Labeled V2	1	
-37	1653845-7	. TUBING, Plastic-Labeled V2	1	
-38	1653845-8	. TUBING, Plastic-Labeled REG	1	
-39	1653845-9	. TUBING, Plastic-Labeled EXH	1	
-40	1656575-1	. VALVE, ASSEMBLY, Slide	1	A
-40	1655046-1	. VALVE, ASSEMBLY, Slide	1	B
		(ATTACHING PARTS)		
-41	NAS1352-08-10P	. SCREW, Cap, Socket Head	4	
-42	MS35338-42	. WASHER, Lock	4	
-43	NAS620-8	. WASHER, Flat	4	
		---*---		
-44	1653711-1	. PLENUM ASSEMBLY	1	
-45	1653900-11	. . MARKER, Identification O_2 OUT	1	
-46	1653900-12	. . MARKER, Identification ACC1	1	
-47	1653900-13	. . MARKER, Identification FLTR3	1	
-48	1653900-14	. . MARKER, Identification FLTR4	1	
-49	1653900-6	. . MARKER, Identification O_2	1	
-50	1654250-1	. . PAD, Damping	1	
		(ATTACHING PARTS)		
-51	NAS620-10	. WASHER, Flat	1	
-52	MS35338-43	. WASHER, Lock	1	
-53	MS35649-202	. NUT, Plain, Hex	1	
-54	A-A-52506TYHD512	. CLAMP, Band	2	
		---*---		
-55	1653712-1	. TUBE, Oxygen, Left	1	
-56	1653876-1	. FILTER ELEMENT, Flareless	1	
-57	MS21921-8D	. NUT, Sleeve Coupling, Flareless	2	
-58	MS21922-8	. SLEEVE COUPLING, Flareless	2	
-59	1653713-1	. TUBE, Oxygen, Right	1	
-60	1653876-1	. FILTER ELEMENT, Flareless	1	
-61	MS21921-8D	. NUT, Sleeve Coupling, Flareless	2	
-62	MS21922-8	. SLEEVE COUPLING, Flareless	2	
-63	1653629-1	. FITTING, Outlet	1	
-64	1632955-5	. VALVE ASSEMBLY, Check	1	
-65	AS3582-022	. PACKING, Preformed	1	
-66	1653871-1	. SPACER, Outlet, O_2	1	
-67	AS3582-022	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-68	NAS620-6	. WASHER, Flat	4	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-20-69	MS35338-41	. WASHER, Lock	4	
-70	NAS1352-06-10P	. SCREW, Cap, Socket Head	4	
		---*---		
-71	1653629-1	. FITTING, Outlet	1	
-72	1632955-5	. VALVE ASSEMBLY, Check	1	
-73	AS3582-022	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-74	NAS620-6	. WASHER, Flat	4	
-75	MS35338-41	. WASHER, Lock	4	
-76	NAS1352-06-6P	. SCREW, Cap, Socket Head	4	
		---*---		
-77	1653708-1	. COVER AND TUBE	1	
-78	1632955-5	. VALVE ASSEMBLY, Check	1	
-79	AS3582-022	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-80	NAS620-6	. WASHER, Flat	4	
-81	MS35338-41	. WASHER, Lock	4	
-82	NAS1352-06-6P	. SCREW, Cap, Socket Head	4	
		---*---		
-83	1653875-1	. NIPPLE, Tapped	1	
-84	1643873-1	. FITTING, Tube	1	
-85	1653860-1	. VALVE ASSEMBLY, Check	1	
-86	1632955-5	. VALVE ASSEMBLY, Check	1	
-87	AS3582-022	. PACKING, Preformed	1	
-88	1653900-5	. MARKER, Identification N_2	1	
		(ATTACHING PARTS)		
-89	NAS620-6	. WASHER, Flat	4	
-90	MS35338-41	. WASHER, Lock	4	
-91	NAS1352-06-6P	. SCREW, Cap, Socket Head	4	
		---*---		
-92	1653706-1	. ELBOWS AND TUBE	2	
-93	1653707-1	. ELBOWS AND TUBE	2	
		(ATTACHING PARTS)		
-94	NAS1352-06-6P	. SCREW, Cap, Socket Head	12	
-95	MS35338-41	. WASHER, Lock	12	
-96	NAS620-6	. WASHER, Flat	12	
-97	1646889-3	. RETAINER, Elbow	4	
-98	AS3582-020	. PACKING, Preformed	4	
-99	NAS1352-08-10P	. SCREW, Cap, Socket Head	8	
-100	MS35338-42	. WASHER, Lock	8	
-101	NAS620-6	. WASHER, Flat	8	
-102	AS3582-017	. PACKING, Preformed	4	
		---*---		
-103	1601381-1	. REPAIR SET, Concentrator, Bed Assembly, O_2	1	
	1653750-1	. . BED ASSEMBLY, Oxygen, Left	REF	
	1653760-1	. . BED ASSEMBLY, Oxygen, Right	REF	
-104	1647059-1	. . MARKER, Identification - Warning	4	
-105	1601382-1-1	. REPAIR SET, Concentrator, Bed Assembly, N_2	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-20-	1653770-1	. . BED ASSEMBLY, Nitrogen, Left	REF	
	1653780-1	. . BED ASSEMBLY, Nitrogen, Right	REF	
-106	1647060-1	. . MARKER, Identification - Warning	2	
-107	1646946-3	. TUBING, Plastic-Labeled 14.5 Inch	1	
-108	1648601-1	. CLEAT, Cable Tie, Adhesive Mount	7	
-109	A-A-52506TYHD512	. CLAMP, Band	2	
-110	1653796-2	. PAD, Damping	2	
-111	1653796-3	. PAD, Damping	4	
-112	1653796-4	. PAD, Damping	2	
-113	MS21266-2N	. GROMMET, Plastic, Edging	AR	

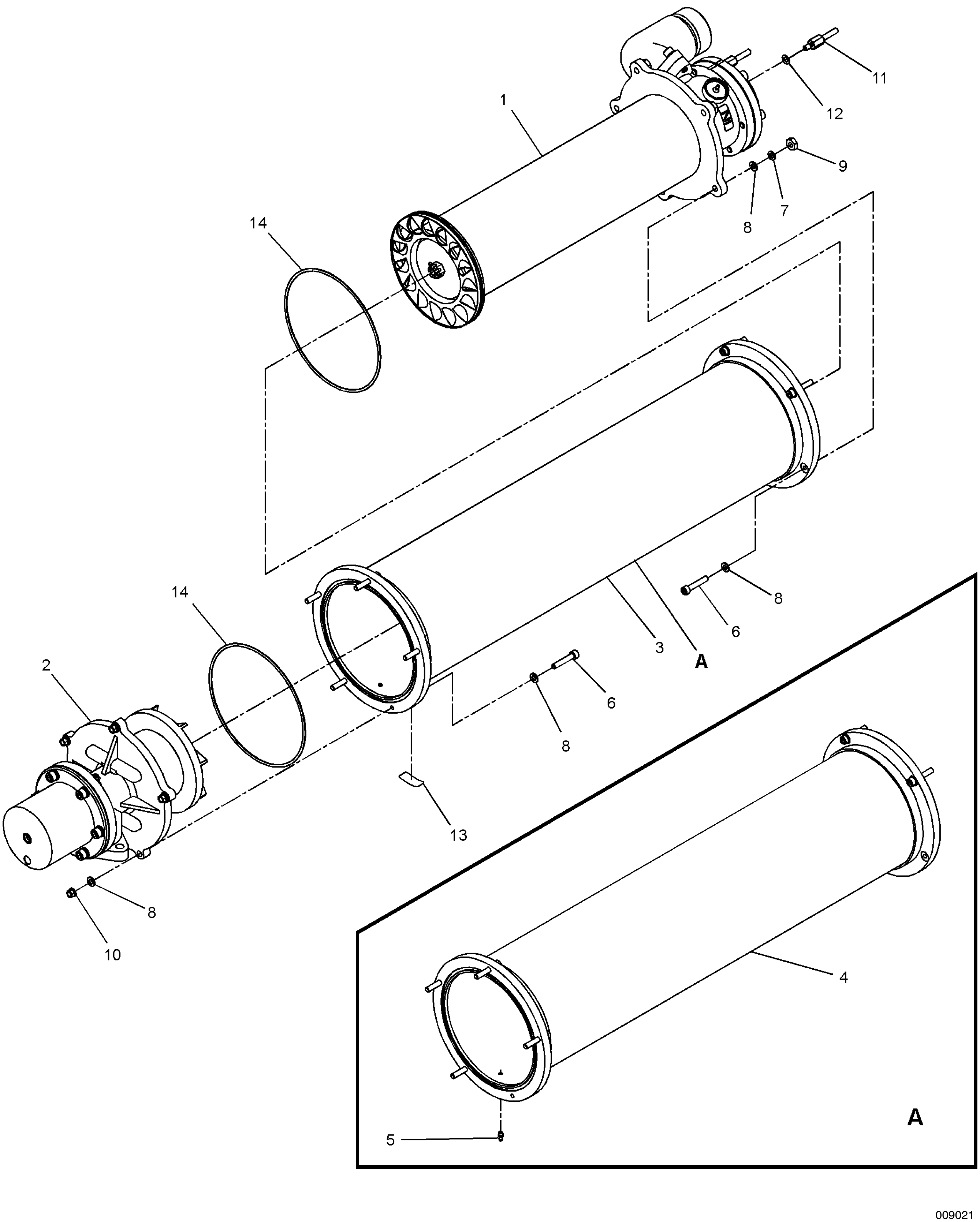


Figure 9-21. Shutoff Valve/Filter/Regulator Assembly, P/N 1653720-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-21	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653720-1	SHUTOFF VALVE/FILTER/REGULATOR ASSEMBLY (NHA, Figure 9-20)	REF	
-1	1653695-1	. SHUTOFF VALVE AND FILTER ASSEMBLY (BREAKDOWN, Figure 9-22)	1	
-2	1653696-1	. REDUCER ASSEMBLY (BREAKDOWN, Figure 9-23)	1	
-3	1653785-1	. ADAPTER and TUBE ASSEMBLY, Shutoff/Filter/Reg	1	
-4	1657455-1	. . ADAPTER and TUBE ASSEMBLY	1	
-5	1643873-1	. . FITTING, Tube	1	
		(ATTACHING PARTS)		
-6	NAS1352-06-12P	. SCREW, Cap, Socket Head	10	
-7	MS35338-41	. WASHER, Lock	5	
-8	NAS620-6	. WASHER, Flat	20	
-9	MS35649-262	. NUT, Plain, Hex	5	
-10	MS21042-06	. NUT, Self-Locking	5	
		---*---		
-11	1653778-1	. STUD, Jack	2	
-12	NAS620-6L	. WASHER, Flat	2	
-13	1653900-1	. MARKER, Identification DRAIN	1	
-14	1646896-1	. PACKING, Preformed	2	

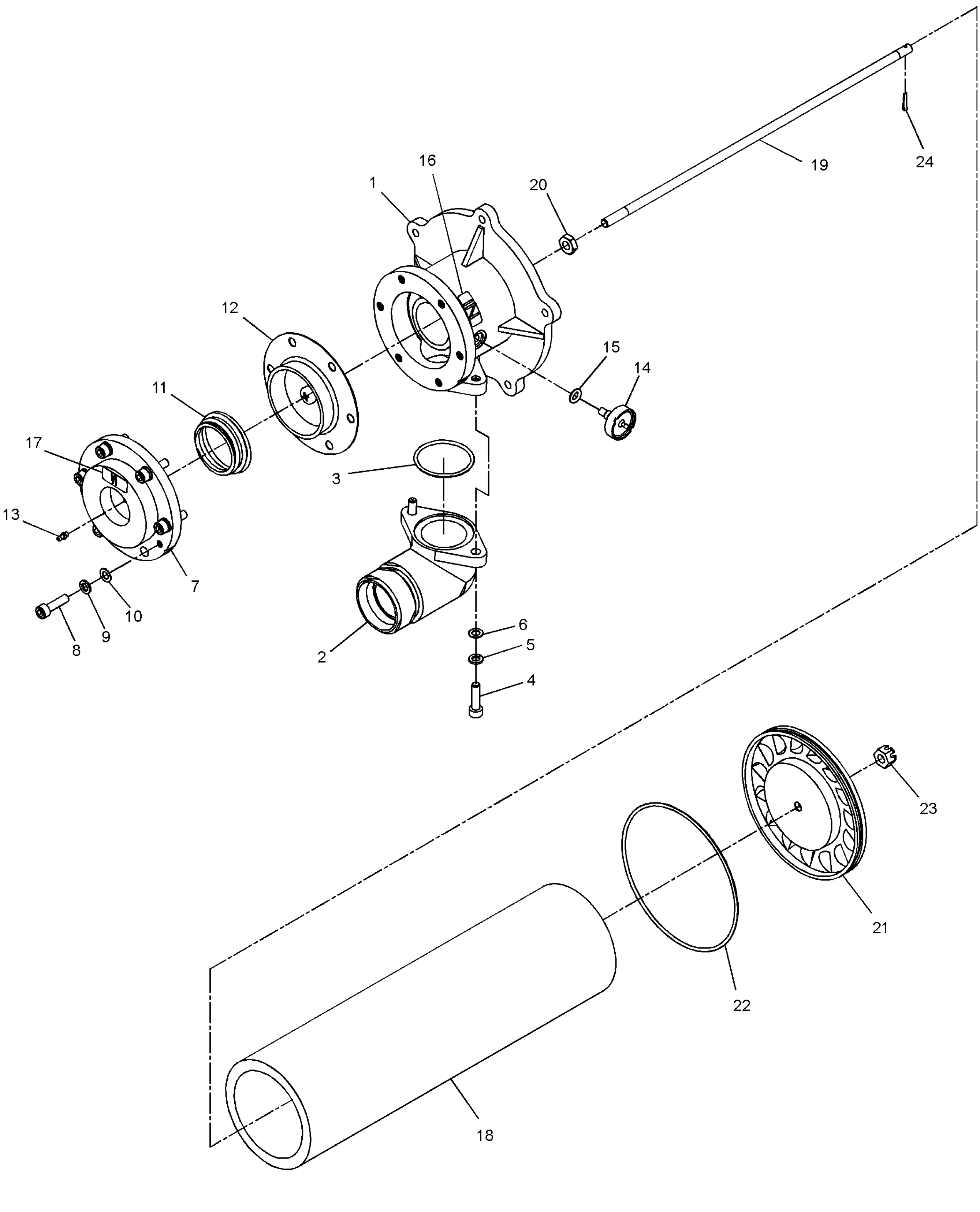


Figure 9-22. Shutoff Valve and Filter Assembly, P/N 1653695-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-22	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653720-1	SHUTOFF VALVE/FILTER/REGULATOR ASSEMBLY (NHA, Figure 9-20)	REF	
	1653695-1	SHUTOFF VALVE and FILTER ASSEMBLY (NHA, Figure 9-21)	REF	
-1	1653783-1	. BASE, Valve, Shutoff	1	
-2	1653765-1	. ELBOW, Unit, Inlet	1	
-3	AS3582-024	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-4	NAS1352C08-10	. SCREW, Cap, Socket Head	2	
-5	MS35338-137	. WASHER, Lock	2	
-6	NAS620C8L	. WASHER, Flat	2	
		---*---		
-7	1653784-1	. CAP, Shutoff	1	
		(ATTACHING PARTS)		
-8	NAS1352C08-10	. SCREW, Cap, Socket Head	6	
-9	MS35338-137	. WASHER, Lock	6	
-10	NAS620C8L	. WASHER, Flat	6	
		---*---		
-11	1646820-1	. SPRING, Conical	1	
-12	1647153-2	. DIAPHRAGM ASSEMBLY, Shutoff	1	
-13	1643873-1	. FITTING, Tube	1	
-14	1653335-1	. FILTER ASSEMBLY	1	
-15	AS3582-008	. PACKING, Preformed	1	
-16	1653900-4	. MARKER, Identification IN	1	
-17	1653900-8	. MARKER, Identification V1	1	
-18	200-35-DX	. FILTER, Element (51440) (VID 1653782-1)	1	
-19	1653776-1	. ROD, Filter	1	
-20	MS35649-204	. NUT, Plain, Hex	1	
-21	1649321-1	. SWIRLER	1	
-22	AS3582-042	. PACKING, Preformed	1	
-23	AN310C3	. NUT, Plain, Castellated	1	
-24	MS24665-1011	. PIN, Cotter	1	

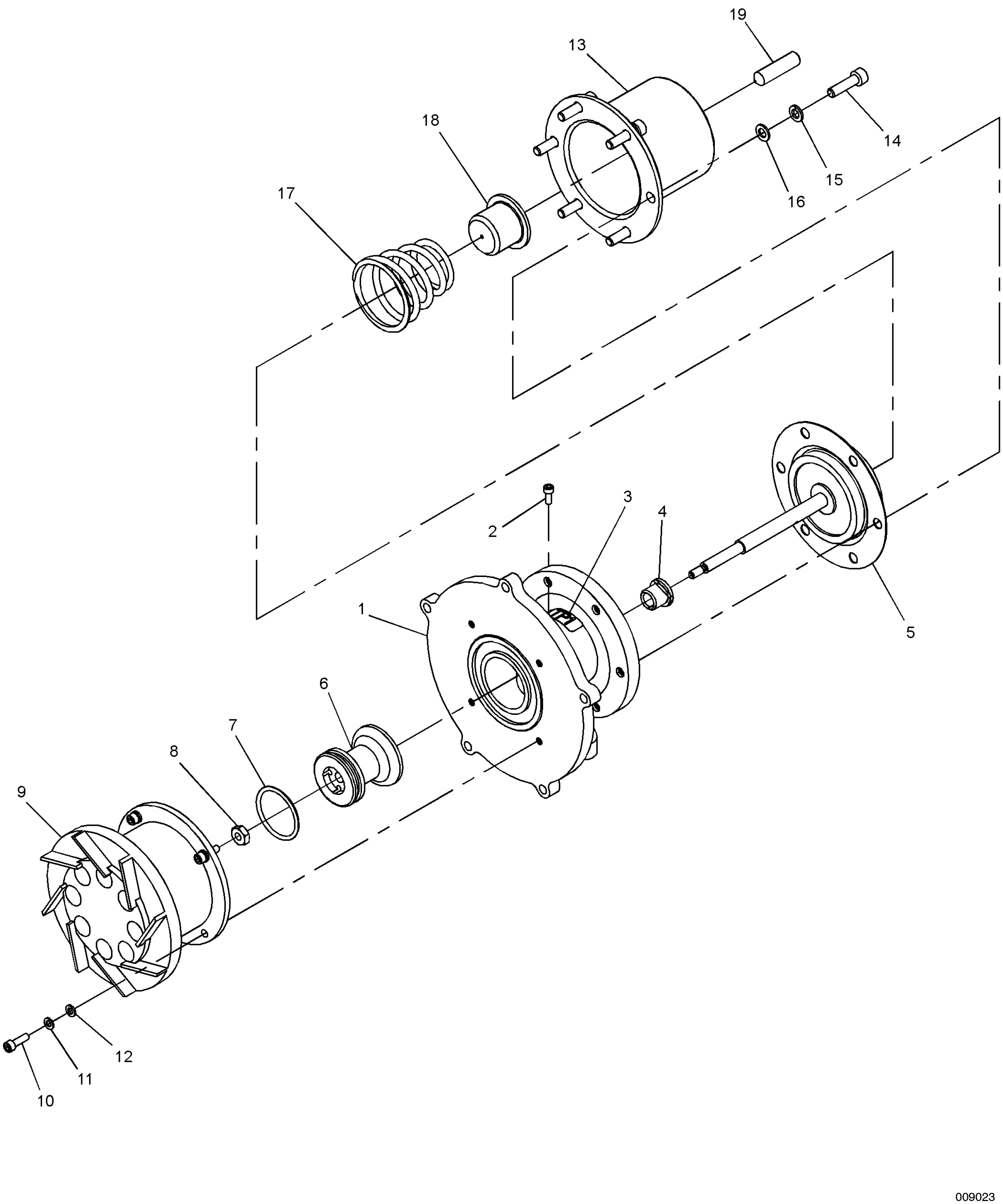


Figure 9-23. Reducer Assembly, P/N 1653696-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-23	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653720-1	SHUTOFF VALVE/FILTER/REGULATOR ASSEMBLY (NHA, Figure 9-20)	REF	
	1653696-1	REDUCER ASSEMBLY (NHA, Figure 9-21)	REF	
-1	1653786-1	. BASE, Regulator	1	
-2	NAS1351-03-4P	. SCREW, Cap, Socket Head	1	
-3	1653900-10	. MARKER, Identification TP1	1	
-4	1643187-2	. BEARING, Flanged	1	
-5	1647152-1	. DIAPHRAGM ASSEMBLY (BREAKDOWN, Figure 9-24)	1	
-6	1646814-2	. PISTON, Regulator	1	
-7	AS3582-020	. PACKING, Preformed	1	
		(ATTACHING PARTS)		
-8	MS35649-262	. NUT, Plain, Hex	1	
		---*---		
-9	1646394-1	. DESWIRLER	1	
		(ATTACHING PARTS)		
-10	NAS1352C04-6	. SCREW, Cap, Socket Head	4	
-11	MS35338-135	. WASHER, Lock	4	
-12	NAS620C4	. WASHER, Flat	4	
		---*---		
-13	1653787-1	. COVER, Spring	1	
		(ATTACHING PARTS)		
-14	NAS1352-08-10P	. SCREW, Cap, Socket Head	6	
-15	MS35338-42	. WASHER, Lock	6	
-16	NAS620C8	. WASHER, Flat	6	
		---*---		
-17	1653850-1	. SPRING, Conical	1	
-18	1653643-1	. RETAINER, Spring	1	
-19	AN565D428H16	. SETSCREW	1	

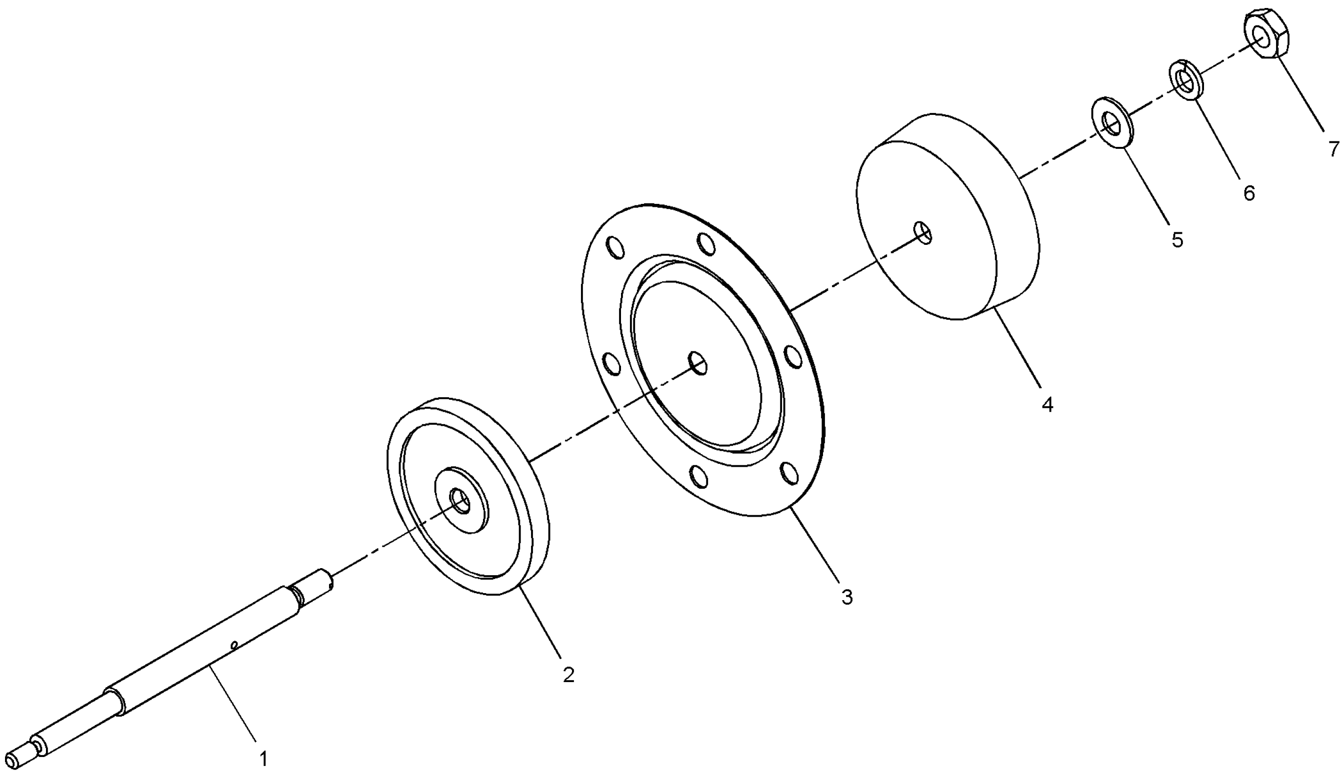


Figure 9-24. Diaphragm Assembly, P/N 1647152-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-24	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR . . . . SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR . . . . SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR . . . . SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653720-1	SHUTOFF VALVE/FILTER/REGULATOR . . . . ASSEMBLY (NHA, Figure 9-20)	REF	
	1653696-1	REDUCER ASSEMBLY (NHA, Figure 9-21)	REF	
	1647152-1	DIAPHRAGM ASSEMBLY (NHA, Figure 9-23) . . .	REF	
-1	1646815-2	. ROD, Regulator Piston	1	
-2	1646810-1	. PLATE, Retainer, Diaphragm	1	
-3	1646809-1	. DIAPHRAGM, Rolling	1	
-4	1646808-1	. PISTON, Diaphragm	1	
-5	AN960C10L	. WASHER, Flat	1	
-6	MS35338-138	. WASHER, Lock . . . . (ATTACHING PARTS)	1	
-7	MS35650-304	. NUT, Plain, Hex . . . . ---*---	1	

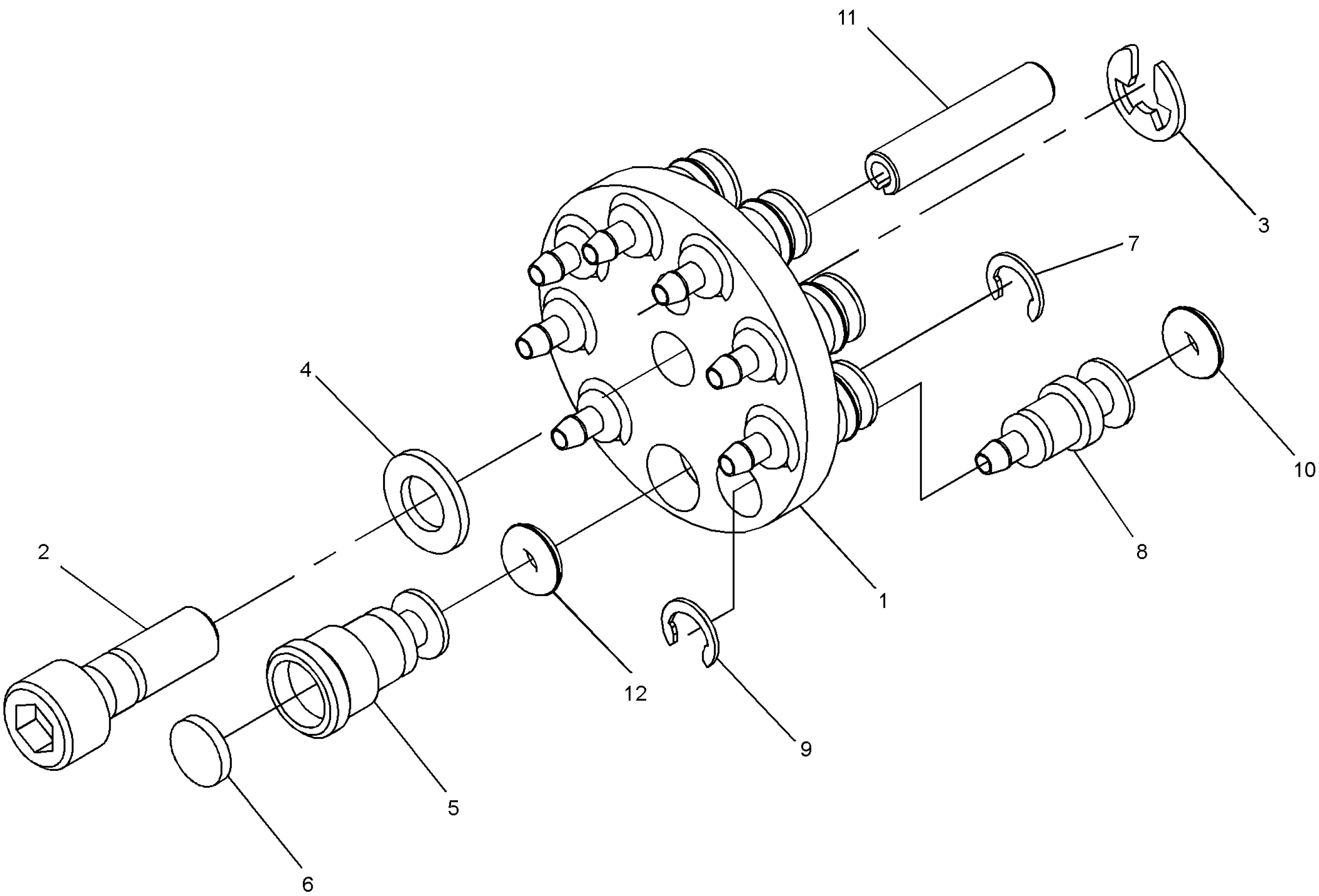


Figure 9-25. Tube Fittings Disc Assembly, P/N 1653870-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-25	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653870-1	DISC ASSEMBLY, Tube Fittings (NHA, Figure 9-20)	REF	
-1	1653866-1	. DISC, Retainer, Tube	1	
		(ATTACHING PARTS)		
-2	1653868-1	. SCREW, Captive	1	
-3	MS16633-1015	. RING, Retainer, External	1	
-4	NAS620-8	. WASHER, Flat	1	
		---*---		
-5	1653880-1	. FITTING, Vacuum	1	
-6	1603942-16	. FILTER, Inlet	1	
-7	MS16632-1015	. RING, Retainer, External	1	
-8	1653867-1	. BARB, Tube Fitting	8	
-9	MS16632-1015	. RING, Retainer, External	8	
-10	MS9068-004	. PACKING, Preformed	9	
-11	MS16562-35	. PIN, Spring, Tubular	1	

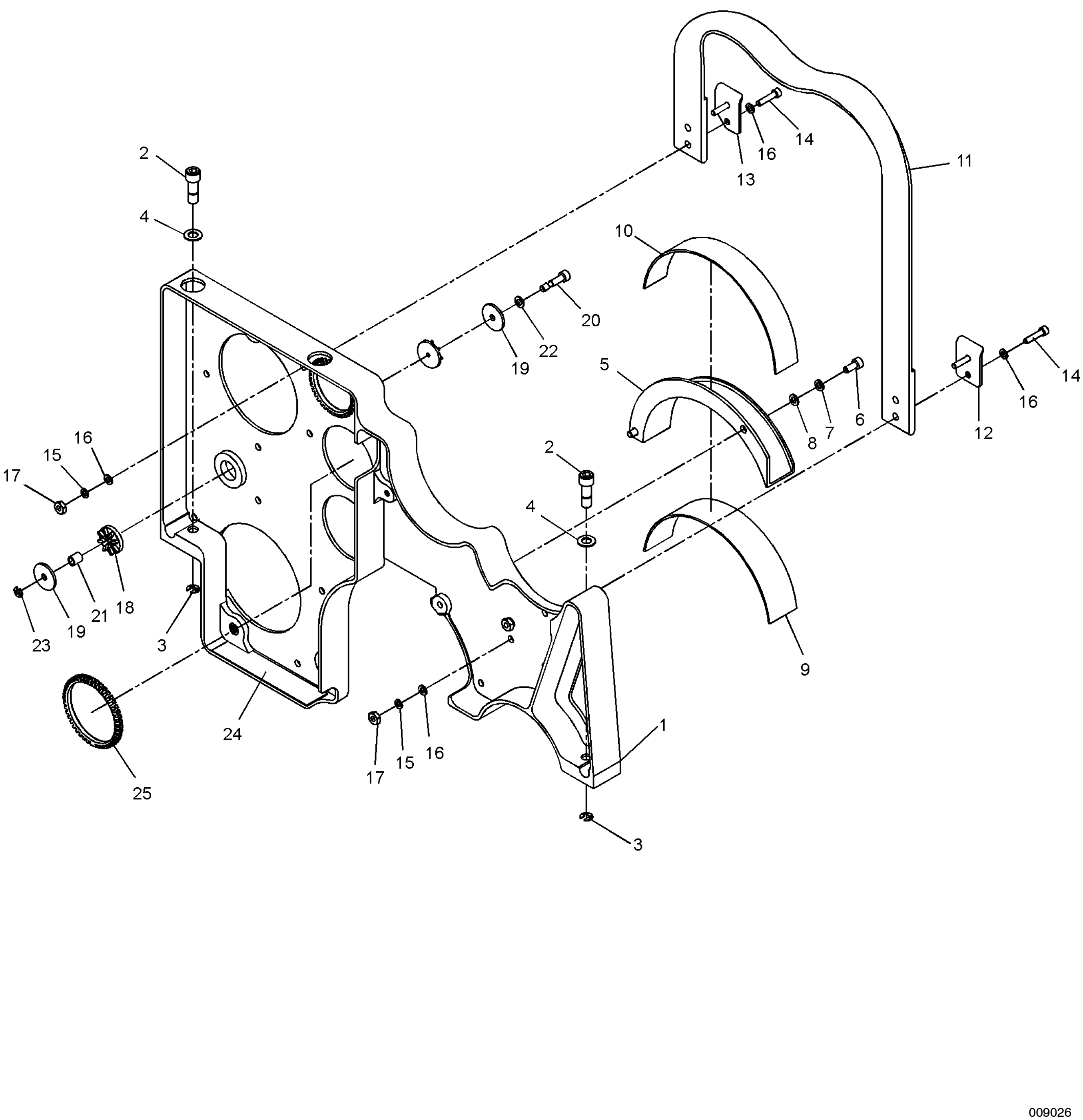


Figure 9-26. Bed Outlet Structure Assembly, P/N 1653714-1

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
9-26	3261129-0102	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A)	REF	A
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 11 and above	REF	B
	3261129-0101	CONCENTRATOR, O_2N_2 MOLECULAR SIEVE (GGU-xx/A) SN 10 and below	REF	C
	1656577-1	CONCENTRATOR ASSEMBLY	REF	A
	1653800-1	CONCENTRATOR ASSEMBLY	REF	B,C
	1656576-1	PRESSURE SWING ADSORPTION UNIT	REF	A
	1653710-1	PRESSURE SWING ADSORPTION UNIT	REF	B,C
	1653714-1	STRUCTURE ASSEMBLY, Bed Outlet (NHA, Figure 9-20)	REF	
-1	1653797-1	. SUPPORT, Bed, Outlet	1	
		(ATTACHING PARTS)		
-2	1654016-1	. SCREW, Captive	2	
-3	MS16633-4018	. RING, Retainer, External	2	
-4	NAS620-416L	. WASHER, Flat	2	
		---*---		
-5	1653637-1	. FLANGE, Retainer, Plenum	1	
		(ATTACHING PARTS)		
-6	NAS1352-08-6P	. SCREW, Cap, Socket Head	2	
-7	MS35338-42	. WASHER, Lock	2	
-8	NAS620-8	. WASHER, Flat	2	
-9	1653796-1	. PAD, Damping	1	
-10	1653796-5	. PAD, Damping	1	
		---*---		
-11	1653872-2	. STRAP, Lifting	1	
		(ATTACHING PARTS)		
-12	1653851-1	. PLATE, Strap	1	
-13	1653851-2	. PLATE, Strap	1	
-14	NAS1352-06-10P	. SCREW, Cap, Socket Head	4	
-15	MS35338-41	. WASHER, Lock	4	
-16	NAS620-6	. WASHER, Flat	8	
-17	MS35649-262	. NUT, Plain, Hex	4	
		---*---		
-18	G-431-1	. GROMMET, Vibration Damping (1M331) (VID 1653873-1)	1	
-19	1653878-1	. RETAINER, Isolation Damper	2	
-20	1653879-1	. SCREW, Captive, Damper	1	
-21	1654017-1	. SLEEVE	1	
-22	NAS620-8	. WASHER, Flat	1	
-23	MS16633-1015	. RING, Retaining, External	1	
-24	1654250-1	. PAD, Damper	1	
-25	MS21266-2N	. GROMMET, Plastic, Edging	AR	

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AN960C10L	9-24-5	PAGZZ
AS3582-008	9-22-15	PAGZZ
AS3582-017	9-20-102	PAGZZ
AS3582-020	9-20-98	PAGZZ
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AS3582-022	9-20-65	PAGZZ
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AS3582-024	9-22-3	PAGZZ
AS3582-042	9-22-22	PAGZZ
G-431-1	9-19-7	PAGZZ
	9-26-18	PAGZZ
MS16562-35	9-25-11	PAGZZ
MS16632-1015	9-25-7	PAGZZ
	9-25-9	PAGZZ
MS16633-1015	9-19-8	PAGZZ
	9-25-3	PAGZZ
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MS16633-4018	9-20-13	PAGZZ
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MS21042-06	9-20-5	PAGZZ
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MS21922-8	9-20-58	PAGZZ
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MS24665-1011	9-22-24	PAGZZ
MS35335-30	9-19-10	PAGZZ
MS35338-41	9-20-3	PAGZZ
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	9-21-REF	PAOGG
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1653880-1	9-25-5	PAGZZ
1653900-1	9-21-13	MGGZZ
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GLOSSARY

ACC. Abbreviation for Air Crew Systems Change.

AIRCREWMEMBER. An aircraft crewmember. Passengers are not considered aircrewmembers.

ANTI-SEIZE TAPE. A tape of any of several thin plastic-film materials (such as tetrafluorethylene) characterized by a waxy, oily texture, and used to prevent binding between mating surfaces of threaded parts when applied to the male threaded portion.

APPROX. Abbreviation for approximately.

ASSEMBLY. A grouping of parts fitted together to form a complete unit.

ATMOSPHERIC PRESSURE. Pressure at sea level, expressed as 14.696 pounds per square inch, absolute, or 29.92 inches mercury column (barometer). See also: PSIA and INHg.

C. Abbreviation for Celsius.

CAUTION. Indicates danger to equipment. The caution precedes the step or item to which it refers.

CDI. Abbreviation for collateral duty inspector.

CCM. Abbreviation for cubic centimeters per minute.

CO_2. Abbreviation for carbon dioxide.

COMBUSTIBLE MATERIAL/SUBSTANCE. Any material or substance capable of burning in the presence of oxygen. See also: EXPLOSIVE MIXTURE, FLAMMABLE MATERIAL.

COML. Abbreviation for commercial. Refers to parts that are commercially available.

COMPONENT. Item of equipment making up part of an assembly or subassembly.

CONFIGURATION. The makeup, size, shape, and relative location of parts of an item of equipment and its accessories. This includes the composition of the materials as well as marking details. The configuration of each equipment is specified by Government drawings, military specifications and modification instructions.

CONVOLUTION. Used in this manual as the protruding side or portion of a diaphragm.

DETAIL PART. See COMPONENT.

DIA. Abbreviation for diameter.

DISPOSITION. Instructions on what is to be done with or to an item.

ELASTOMER. Any of various elastic substances resembling rubber.

ENSURE. To inspect closely, and to test the condition of an item.

EXAMINE. To inspect closely, and to test the condition of an item.

EXPLOSIVE MIXTURE. Any mixture of a combustible material or substance and oxygen capable of violent burning (detonation) either spontaneously or with the external application of heat. See also: COMBUSTIBLE MATERIAL/SUBSTANCE FLAMMABLE Material.

F. Abbreviation for Fahrenheit.

FLAMMABLE MATERIAL. Any material capable of being easily ignited and of burning with extreme rapidity.

FLAP PATTERN. See TEMPLATE.

FLUID. Gas, vapor, or liquid.

FREEZING POINT. Temperature at which a given liquid substance will solidify or freeze upon removal of heat. Freezing point of water is 32°F (0°C).

FULL. (In reference to oxygen cylinders) A full oxygen cylinder is a cylinder which is pressurized to its rated pressure. With respect to a high pressure oxygen cylinder. 1800 psig is considered full.

FUNCTIONAL TEST. A test which puts an item to use to determine if it operates properly.

GAPL. Abbreviation for Group Assembly Parts List. The GAPL, a section of the Illustrated Parts Breakdown, shows how major assemblies are disassembled into assemblies and detail parts.

HEAT EXCHANGER. Apparatus in which heat is exchanged from one fluid to another.

H_2O. Abbreviation for water.

Hg. Abbreviation for mercury.

IN. Abbreviation for inches.

IND. Abbreviation for indicated.

INH_2O. Abbreviation for inches of water column (27.68 inH_2O equals 1.0 PSI equals 2.036 inHg). See Also: inHg.

INHg. Abbreviation for inches of mercury column (0.07349 inHg equals 1.0 inH_2O). See also: inH_2O.

INSPECTION. A close examination for damage, wear and dirt. Also, a regularly scheduled examination of oxygen equipment and accessories.

LBS. Abbreviation for pounds.

LOX. Abbreviation for liquid oxygen.

LPM. Abbreviation for liters per minute.

MANUFACTURER'S CODES. Identification codes for every manufacturer listed as a procurement source in accordance with cataloging handbooks H4/H8, Commercial and Government Entity Codes.

MM. Abbreviation for millimeters.

MOLECULAR SIEVE. A cannister containing a nitrogen-absorbing chemical compound (zeolite) through which air is forced, providing enriched breathing oxygen.

NOC. Abbreviation for Navy Oxygen Cleaner.

NOTE. An informative item. The note may precede or follow the step or item to which it refers.

NUMERICAL INDEX. A part of the Illustrated Parts Breakdown. The numerical index includes all the part numbers listed in the GAPL, arranged in alphabetical-numerical sequence.

OBOGS. Abbreviation for Onboard Oxygen Generating System.

OEAS. Abbreviation for Oxygen Enriched Air System.

PRESSURE. The force exerted by a liquid or gas per unit of area on the walls of a container. See also: PSM, PSIA, and ATMOSPHERIC PRESSURE.

PRESSURE DROP. Loss in pressure, as from one end of a distribution line to the other, due to friction and other factors.

PRESSURE EXPLOSION. Explosion caused by rapid conversion of liquid oxygen to gaseous oxygen in a confined space due to evaporation and warming.

PROPER. Correct or authorized configuration or method.

PSI. Abbreviation for pounds per square inch. See also: PSI and PSIG.

PSIA. Abbreviation for pounds per square inch, absolute. Absolute pressure is measured from absolute zero (100% vacuum), rather than from normal, or atmospheric pressure. It equals gage pressure plus 14.696 pounds per square inch. See also: PSI, PSIG, and ATMOSPHERIC PRESSURE.

PSIG. Abbreviation for pounds per square inch, gage. Indicates pressure above ambient pressure, as indicated on a pressure gage vented to the atmosphere. See also: PSI and PSIA.

QA. Abbreviation for quality assurance.

QUALIFIED PERSONNEL. Qualified personnel are defined as personnel who have satisfactorily completed a prescribed course at a Navy Training School Fleet Readiness Aviation Maintenance Personnel Training Program (AMP), Inter Service/Factory Training, formal or informal In-Service Training (refer to OPNAVINST 4790.2 Series). In addition, a practical demonstration of the skills acquired in any of the foregoing training situations, to the satisfaction of the Work Center Supervisor/Division Officer is required before the designation "Qualified" can be assigned.

R. Abbreviation for radius.

REFILL. (In reference to oxygen cylinders) To refill is to recharge a cylinder, regardless of the residual pressure remaining within the cylinder.

REPAIRS, MAJOR. Repairs requiring special equipment, personnel, or materials normally not available at intermediate or local levels of maintenance.

REPAIRS, MINOR. Repairs that can be effected at intermediate or local levels of maintenance.

REF. Abbreviation for reference.

SM&R CODES. Abbreviation for source, maintenance, and recoverability codes. Comprised of three parts, a two-position source code, a two-position maintenance code, and a one-position recoverability code. Refer to NAVSUPINST 4423.29 for further details.

SPECIFIC GRAVITY. Density of fluid compared to density of water.

TEMPLATE. A pattern or gage usually in the form of a thin plate of cardboard, wood, or metal. It is used as a guide in the layout or cutting of flat work.

TORQUE. A force, or combination of forces, that tend to produce a rotating or twisting motion. Torque is often expressed pounds-inch (lbs-in.) or pounds-foot (lbs-ft.). A torque wrench is used to apply a measured torque.

TYP. Abbreviation for typical.

WARNING. Indicates danger to personnel. The warning precedes the step or item to which it refers.

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